CHROMATOGRAM
Retention time: 6.3

OTHER SUBSTANCES
Simultaneous: tazobactam

KEY WORDS
stability-indicating; 5% dextrose; injections

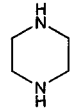
REFERENCE
Park,T.W.; Le-Bui,L.P.K.; Chung,K.C.; Rho,J.P.; Gill,M.A. Stability of piperacillin sodium-tazobactam sodium in peritoneal dialysis solutions, *Am.J.Health-Syst.Pharm.*, **1995**, *52*, 2022–2024.

SAMPLE
Matrix: solutions
Sample preparation: Separate buffer containing drug from human serum albumin by centrifuging at 37° at 700 g for 3 min using a Micropartition System MPS-1 (Amicon) unit, inject a 10-20 μL aliquot of the ultrafiltrate.

HPLC VARIABLES
Guard column: C18/Corasil (Waters)
Column: 300 × 3.9 μBondapak C18
Mobile phase: MeCN:10 mM ammonium acetate + 10 mM tetrabutylammonium bromide + 1% acetic acid 35:65
Flow rate: 1.5
Injection volume: 10-20
Detector: UV 230

REFERENCE
Terasaki,T.; Nouda,H.; Tsuji,A. Relationship between lipophilicity and binding affinity with human serum albumin for penicillin and cephem antibiotics, *J.Pharmacobiodyn.*, **1992**, *15*, 99–106.

Piperazine



Molecular formula: $C_4H_{10}N_2$
Molecular weight: 86.14
CAS Registry No.: 110-85-0, 18534-18-4 (phosphate monohydrate), 14538-56-8 (phosphate), 142-88-1 (adipate), 144-29-6 (citrate), 41372-10-5 (citrate hydrate), 12002-30-1 (edetate calcium), 50322-15-1 (edetate calcium dihydrate), 133-36-8 (tartrate)
Merck Index: 7617

SAMPLE
Matrix: formulations
Sample preparation: Tablets. Grind tablets to a fine powder, weigh out amount equivalent to about 200 mg piperazine citrate, dissolve in 50 mL water, sonicate for 15 min, make up to 100 mL with water, filter (0.45 μm). Remove a 3 mL aliquot and add it to 2 mL 4 mg/mL 1-benzylpiperazine in acetone:water 50:50, add 10 mL of a filtered 5 mg/mL solution of dansyl chloride in acetone, add 10 mL base solution, mix, sonicate for 10 min, let stand in the dark for 30 min, add 20 mL water, add 20 mL chloroform, shake vigorously for 1 min, filter the chloroform layer through anhydrous sodium sulfate, dilute 2 mL of the filtrate to 5 mL with mobile phase, inject an aliquot. Syrup. Dilute 5 mL syrup to 100 mL with water, mix, measure out an aliquot equivalent to about 200 mg piperazine citrate, make up to 100 mL with water, mix. Remove a 3 mL aliquot and add it to 2 mL 4 mg/mL 1-benzylpiperazine in acetone:water 50:50, add 10 mL of a filtered 5 mg/mL solution of dansyl chloride in acetone, add 10 mL base solution, mix, sonicate for 10 min, let stand in the dark for 30 min, add 20 mL water, add 20 mL chloroform, shake vigorously for 1 min, filter the chloroform layer through anhydrous sodium sulfate, dilute 2 mL of the filtrate to 5 mL with mobile phase, inject an aliquot. Granules, powders (effervescent). Weigh out amount equivalent to about 200 mg piperazine citrate, slowly

add 50 mL water with swirling, sonicate for 10 min, make up to 100 mL with water, filter (0.45 μm). Remove a 3 mL aliquot and add it to 2 mL 4 mg/mL 1-benzylpiperazine in acetone:water 50:50, add 10 mL of a filtered 5 mg/mL solution of dansyl chloride in acetone, add 10 mL base solution, mix, sonicate for 10 min, let stand in the dark for 30 min, add 20 mL water, add 20 mL chloroform, shake vigorously for 1 min, filter the chloroform layer through anhydrous sodium sulfate, dilute 2 mL of the filtrate to 5 mL with mobile phase, inject an aliquot. (Prepare base solution by dissolving 550 mg anhydrous sodium carbonate in 300 mL water, add 300 mL acetone, mix.)

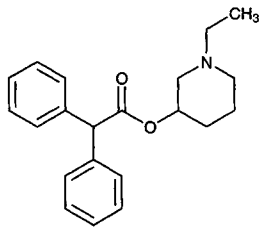
HPLC VARIABLES
Column: 250 × 4.6 5 μm CN5 SG cyanopropyl (Burdick & Jackson)
Mobile phase: Hexane:isopropanol 85:15
Flow rate: 1.5
Injection volume: 20
Detector: UV 335

CHROMATOGRAM
Retention time: 8.5
Internal standard: 1-benzylpiperazine (4.0)

KEY WORDS
derivatization; tablets; syrup; granules; powders

REFERENCE
Lau-Cam,C.A.; Roos,R.W. Normal-phase high performance liquid chromatographic method with dansylation for the assay of piperazine citrate in dosage forms, *J.Liq.Chromatogr.*, **1995**, *18*, 3347–3357.

Piperidolate



Molecular formula: $C_{21}H_{25}NO_2$
Molecular weight: 323.44
CAS Registry No.: 82-98-4, 129-77-1 (HCl)
Merck Index: 7623
Lednicer No.: 1 91

SAMPLE
Matrix: solutions
Sample preparation: Prepare a 10 μg/mL solution in MeOH, inject a 20 μL aliquot.

HPLC VARIABLES
Column: 125 × 4.9 Spherisorb S5W silica
Mobile phase: MeOH containing 10 mM ammonium perchlorate and 1 mL/L 100 mM NaOH in MeOH, pH 6.7
Flow rate: 2
Injection volume: 20
Detector: E, LeCarbone, V25 glassy carbon electrode, + 1.2 V

CHROMATOGRAM
Retention time: 2.5

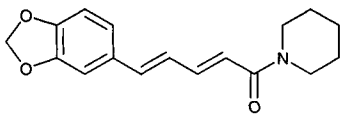
OTHER SUBSTANCES
Also analyzed: acebutolol, acepromazine, acetophenazine, N-acetylprocainamide, albuterol, alprenolol, amethocaine, amiodarone, amitriptyline, antazoline, atenolol, azacyclonal, bamethan, benactyzine, benperidol, benzethidine, benzocaine, benzoctamine, benzphetamine, benzquinamide, bromhexine, bromodiphenhydramine, bromperidol, brompheniramine, brompromazine, buclizine, bufotenine, bupivacaine, buprenorphine, butacaine, butethamate, chlorcyclizine, chlorpheniramine, chlorphenoxamine, chlorprenaline, chlorpromazine, chlorprothixene, cimetidine, cinchonidine, cinnarizine, clemastine, clomipramine, clonidine, cocaine, cyclazocine, cy-

clizine, cyclopentamine, cyproheptadine, deserpidine, desipramine, dextromoramide, dextropropoxyphene, dicyclomine, diethylcarbamazine, diethylpropion, diethylthiambutene, dihydroergotamine, dimethindene, dimethothiazine, diphenhydramine, diphenoxylate, dipipanone, diprenorphine, dipyridamole, disopyramide, dothiepin, doxapram, doxepin, doxylamine, droperidol, ephedrine, ergocornine, ergocristine, ergocristinine, ergocryptine, ergometrine, ergosine, ergosinine, ergotamine, ethopropazine, etorphine, etoxeridine, fenethazine, fenfluramine, fenoterol, fentanyl, flavoxate, fluopromazine, flupenthixol, fluphenazine, flurazepam, haloperidol, hydroxyzine, hyoscine, ibogaine, imipramine, indapamine, iprindole, isothipendyl, isoxsuprine, ketanserin, laudanosine, lidocaine, lofepramine, loxapine, maprotiline, mecamylamine, meclophenoxate, meclozine, medazepam, mephentermine, mepivacaine, meptazinol, mepyramine, mesoridazine, metaraminol, methadone, methamphetamine, methapyrilene, methdilazene, methotrimeprazine, methoxamine, methoxyphenamine, methoxypromazine, methylephedrine, methylergonovine, methysergide, metoclopramide, metopimazine, metoprolol, mianserin, morazone, nadolol, nalorphine, naloxone, naphazoline, nicotine, nifedipine, nomifensine, nortriptyline, noscapine, orphenadrine, oxeladin, oxprenolol, oxymetazolin, papaverine, pargyline, pecazine, penbutolol, pentazocine, penthienate, pericyazine, perphenazine, phenadoxone, phenampromide, phenazocine, phenbutrazate, phendimetrazine, phenelzine, phenglutarimide, phenindamine, pheniramine, phenmetrazine, phenomorphan, phenoperidine, phenothiazine, phenoxybenzamine, phentolamine, phenylephrine, phenyltoloxamine, physostigmine, piminodine, pimozide, pindolol, pipamazine, pipazethate, piperacetazine, pipradol, pirenzepine, piritramide, pizotifen, practolol, pramoxine, prazosin, prenylamine, prilocaine, primaquine, proadifen, procainamide, procaine, prochlorperazine, procyclidine, proheptazine, prolintane, promazine, promethazine, pronethalol, properidine, propiomazine, propranolol, prothipendyl, protriptyline, proxymetacaine, pseudoephedrine, pyrimethamine, quinidine, quinine, ranitidine, rescinnamine, sotalol, tacrine, terazosin, terbutaline, terfenadine, thenyldiamine, theophylline, thiethylperazine, thiopropazate, thioproperazine, thioridazine, thiothixene, thonzylamine, timolol, tocainide, tolpropamine, tolycaine, tranylcypromine, trazodone, trifluoperazine, trifluperidol, trimeperidine, trimeprazine, trimethobenzamide, trimethoprim, trimipramine, tripelennamine, triprolidine, tryptamine, verapamil, xylometazoline

REFERENCE

Jane,I.; McKinnon,A.; Flanagan,R.J. High-performance liquid chromatographic analysis of basic drugs on silica columns using non-aqueous ionic eluents. II. Application of UV, fluorescence and electrochemical oxidation detection, *J.Chromatogr.*, **1985**, *323*, 191–225.

Piperine



Molecular formula: $C_{17}H_{19}NO_3$
Molecular weight: 285.34
CAS Registry No.: 94-62-2
Merck Index: 7625

SAMPLE

Matrix: blood, urine

Sample preparation: Add 1 mL whole blood or urine to Toxi-Tube A (Toxi-Lab, Irvine CA), add 3 mL water, mix by gentle inversion for 5 min, centrifuge at 1500 g for 5 min. Remove the organic layer and evaporate it to dryness under a stream of nitrogen at 40°, reconstitute the residue with 50 µL MeCN:water 50:50, vortex for 10 s, centrifuge at 7500 g for 2 min, inject a 10 (urine) or 30 (blood) µL aliquot. (The detector wavelength shown is the wavelength of maximum absorbance. This will not necessarily be the optimal wavelength for the separation. Multiple wavelengths from 200-350 nm can be scanned using a diode-array detector. Otherwise, 220 nm may be a reasonable choice for initial work. Matrix may interfere.)

HPLC VARIABLES

Guard column: 20 mm long Symmetry C18
Column: 250 × 4.6 5 µm Symmetry C8 (Waters)
Mobile phase: Gradient. A was 50 mM pH 3.8 sodium phosphate buffer. B was MeCN. A:B 85:15 for 6.5 min, 65:35 for 18.5 min, 20:80 for 3 min (step gradient), re-equilibrate at initial conditions for 7 min.
Column temperature: 30

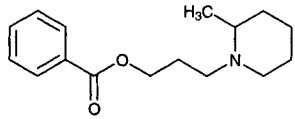
Flow rate: 1 for 6.5 min, to 1.5 over 18.5 min, maintain at 1.5 for 3 min (re-equilibrate at 1.5 mL/min)
Injection volume: 10-30
Detector: UV 341.5

CHROMATOGRAM
Retention time: 20.373

KEY WORDS
whole blood

REFERENCE
Gaillard,Y.; Pépin,G. Use of high-performance liquid chromatography with photodiode-array UV detection for the creation of a 600-compound library. Application to forensic toxicology, *J.Chromatogr.A*, **1997**, *763*, 149–163.

Piperocaine



Molecular formula: $C_{16}H_{23}NO_2$
Molecular weight: 261.36
CAS Registry No.: 136-82-3, 533-28-8 (HCl)
Merck Index: 7627
Lednicer No.: 1 13

SAMPLE
Matrix: solutions

HPLC VARIABLES
Column: 250 × 4.6 Zorbax RX
Mobile phase: Gradient. A was 10 mL concentrated orthophosphoric acid and 7 mL triethylamine in 1 L water. B was 10 mL concentrated orthophosphoric acid and 7 mL triethylamine in 200 mL water, make up to 1 L with MeCN. A:B from 100:0 to 0:100 over 30 min, maintain at 0:100 for 5 min.
Column temperature: 30
Flow rate: 2
Detector: UV 210

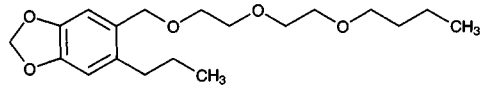
OTHER SUBSTANCES
Also analyzed: acepromazine, acetaminophen, acetophenazine, albuterol, aminophylline, amitriptyline, amobarbital, amoxapine, amphetamine, amylocaine, antipyrine, aprobarbital, aspirin, atenolol, atropine, avermectin, barbital, benzocaine, benzoic acid, benzotropine, benzphetamine, berberine, bibucaine, bromazepan, brompheniramine, buprenorphine, buspirone, butabarbital, butacaine, butethal, caffeine, carbamazepine, carbromal, chloramphenicol, chlordiazepoxide, chloroquine, chlorothiazide, chloroxylenol, chlorphenesin, chlorpheniramine, chlorpromazine, chlorpropamide, chlortetracycline, cimetidine, cinchonidine, cinchonine, clenbuterol, clonazepam, clonixin, clorazepate, cocaine, codeine, colchicine, cortisone, coumarin, cyclazocine, cyclobenzaprine, cyclothiazide, cyheptamide, cymarin, danazol, danthron, dapsone, debrisoquine, desipramine, dexamethasone, dextromethorphan, dextropropoxyphene, diamorphine, diazepam, diclofenac, diethylpropion, diethylstilbestrol, diflunisal, digitoxin, digoxin, diltiazem, diphenhydramine, diphenoxylate, diprenorphine, dipyrone, disulfiram, dopamine, doxapram, doxepin, dronabinol, ephedrine, epinephrine, epinine, estradiol, estriol, estrone, ethacrynic acid, ethosuximide, etonitazene, etorphine, eugenol, famotidine, fenbendazole, fencamfamine, fenoprofen, fenproporex, fentanyl, flubendazole, flufenamic acid, flunitrazepam, 5-fluorouracil, fluoxymesterone, fluphenazine, furosemide, gentisic acid, gitoxigenin, glipizide, glunixin, glutethimide, glybenclamide, guaiacol, halazepam, haloperidol, hydrochlorothiazide, hydrocodone, hydrocortisone, hydromorphone, hydroxyquinoline, ibogaine, ibuprofen, iminostilbene, imipramine, indomethacin, isocarbostyril, isocarboxazid, isoniazid, isoproterenol, isoxsuprine, ivermectin, ketamine, ketoprofen, kynurenic acid, levorphanol, lidocaine, lorazepam,

lormetazepam, loxapine, mazindol, mebendazole, meclizine, meclofenamic acid, medazepam, mefenamic acid, megestrol, mepacrine, meperidine, mephentermine, mephenytoin, mephesin, mephobarbital, mepivacaine, mescaline, mesoridazine, methadone, methamphetamine, methapyrilene, methaqualone, methazolamide, methocarbamol, methoxamine, methsuximide, methyl salicylate, methyldopa, methyldopamine, methylphenidate, methylprednisolone, methyltestosterone, methyprylon, metoprolol, mibolerone, morphine, nadolol, nalorphine, naloxone, naltrexone, naphazoline, naproxen, nefopam, niacinamide, nicotine, niacin, nifedipine, niflumic acid, nitrazepam, norepinephrine, nortriptyline, noscapine, nylidrin, oxazepam, oxycodone, oxymorphone, oxyphenbutazone, oxytetracycline, papaverine, pargyline, pemoline, pentazocine, pentobarbital, persantine, phenacetin, phenazocine, phenazopyridine, phencyclidine, phendimetrazine, phenelzine, pheniramine, phenobarbital, phenothiazine, phensuximide, phentermine, phenylbutazone, phenylephrine, prazepam, prednisolone, primidone, probenecid, progesterone, propiomazine, propranolol, propylparaben, pseudoephedrine, puromycin, pyrilamine, pyrithyldione, quazepam, quinaldic acid, quinidine, quinine, ranitidine, recinnamine, reserpine, resorcinol, saccharin, albuterol, salicylamide, salicylic acid, scopolamine, scopoletin, secobarbital, strychnine, sulfacetamide, sufadiazine, sulfadimethoxine, sulfaethidole, sulfamerazine, sulfamethazine, sulfamethoxizole, sulfanilamide, sulfapyridine, sulfasoxizole, sulindac, tamoxifen, temazepam, testosterone, tetracaine, tetracycline, tetramisole, thebaine, theobromine, theophylline, thiabendazole, thiamine, thiamylal, thiobarbituric acid, thioridazine, thiosalicylic acid, thiothixene, thymol, tolazamide, tolazoline, tobutamide, tolmetin, tranylcypromine, triamcinolone, tribenzylamine, trichloromethiazide, trifluoperazine, trihexyphenidyl, trimethoprim, tripelennamine, triprolidine, tropacocaine, tyramine, verapamil, vincamine, warfarin, yohimbine, zoxazolamine

REFERENCE

Hill,D.W.; Kind,A.J. Reversed-phase solvent gradient HPLC retention indexes of drugs, *J.Anal.Toxicol.*, **1994**, *18*, 233–242.

Piperonyl butoxide



Molecular formula: $C_{19}H_{30}O_5$
Molecular weight: 338.44
CAS Registry No.: 51-03-6
Merck Index: 7629

SAMPLE

Matrix: blood
Sample preparation: Dilute plasma with an equal volume of water. Inject a 20-100 μL aliquot onto column A and elute to waste with mobile phase A, after 5 min elute the contents of column A onto column B with mobile phase B, after 30 s remove column A from the circuit, elute column B with mobile phase B and monitor the effluent from column B. Wash column A with MeOH:water 10:90 for 10.5 min and with water for 1 min.

HPLC VARIABLES

Column: A 5 × 4 30-40 μm Perisorb RP-18 (Merck); B 250 × 4 7 μm LiChrosorb RP-18
Mobile phase: A water; B MeOH:water 82:18
Flow rate: 0.5
Injection volume: 20-100
Detector: UV 254

CHROMATOGRAM

Retention time: 12
Limit of detection: 130 ng/mL

OTHER SUBSTANCES

Extracted: pyrethrins

KEY WORDS

plasma; column-switching

REFERENCE
Wintersteiger,R.; Ofner,B.; Juan,H.; Windisch,M. Determination of traces of pyrethrins and piperonyl butoxide in biological material by high-performance liquid chromatography, *J.Chromatogr.A*, **1994**, *660*, 205–210.

SAMPLE
Matrix: blood, urine
Sample preparation: Add 1 mL whole blood or urine to Toxi-Tube A (Toxi-Lab, Irvine CA), add 3 mL water, mix by gentle inversion for 5 min, centrifuge at 1500 g for 5 min. Remove the organic layer and evaporate it to dryness under a stream of nitrogen at 40°, reconstitute the residue with 50 μL MeCN:water 50:50, vortex for 10 s, centrifuge at 7500 g for 2 min, inject a 10 (urine) or 30 (blood) μL aliquot. (The detector wavelength shown is the wavelength of maximum absorbance. This will not necessarily be the optimal wavelength for the separation. Multiple wavelengths from 200-350 nm can be scanned using a diode-array detector. Otherwise, 220 nm may be a reasonable choice for initial work. Matrix may interfere.)

HPLC VARIABLES
Guard column: 20 mm long Symmetry C18
Column: 250 × 4.6 5 μm Symmetry C8 (Waters)
Mobile phase: Gradient. A was 50 mM pH 3.8 sodium phosphate buffer. B was MeCN. A:B 85:15 for 6.5 min, 65:35 for 18.5 min, 20:80 for 3 min (step gradient), re-equilibrate at initial conditions for 7 min.
Column temperature: 30
Flow rate: 1 for 6.5 min, to 1.5 over 18.5 min, maintain at 1.5 for 3 min (re-equilibrate at 1.5 mL/min)
Injection volume: 10-30
Detector: UV 202.8

CHROMATOGRAM
Retention time: 27.627

KEY WORDS
whole blood

REFERENCE
Gaillard,Y.; Pépin,G. Use of high-performance liquid chromatography with photodiode-array UV detection for the creation of a 600-compound library. Application to forensic toxicology, *J.Chromatogr.A*, **1997**, *763*, 149–163.

SAMPLE
Matrix: fruit, grain, vegetables
Sample preparation: Homogenize (Polytron) 150 g high moisture sample and 300 mL MeOH at half speed for 30 s and full speed for 1 min, filter (paper) under vacuum, remove portion of filtrate equal to 100 g sample and make up to 100 mL with water. Homogenize (Polytron) 75 g low moisture sample and 300 mL MeOH at half speed for 30 s and full speed for 1 min, filter (paper) under vacuum, remove portion of filtrate equal to 50 g sample and make up to 100 mL with water. Concentrate samples to 75 mL under reduced pressure at 35°, add 15 g NaCl, add 75 mL MeCN, shake for 30 s, let stand for 5 min. Remove the aqueous phase and add it to 50 mL MeCN, shake for 20 s, let layers separate, discard the aqueous layer. Combine the MeCN layers, wash with 25 mL 20% NaCl, wash with 100 mL petroleum ether, extract petroleum ether layer with 10 mL MeCN. Combine the MeCN layers and add them to 50 mL 2% NaCl, extract with 100 mL dichloromethane, extract twice with 25 mL portions of dichloromethane. Combine the dichloromethane layers and pass them through a 22 mm i.d. column containing 5 g anhydrous sodium sulfate. Evaporate the eluate to dryness under reduced pressure at 35°, reconstitute in 10 mL dichloromethane, add to the charcoal column, rinse flask with 10 mL dichloromethane, rinse flask with 25 mL MeCN:toluene 75:25. Evaporate the eluate to dryness under reduced pressure at 35°, reconstitute with 5 mL MeOH, filter (5 μm), inject a 10 μL aliquot (J. Assoc. Off.Anal. Chem. 1980, 63, 1114). (Charcoal column was 5 g silanized Celite 545:Nuchar S-N 4:1 on top of 0.5 g silanized Celite 545 in a 300 × 22 glass column, wash with 50 mL MeCN:toluene 75:25, do not allow to go dry. Prepare silanized Celite 545 as follows. Boil 150 g Celite 545 in 1 L 6 M HCl with stirring for 10 min, cool, filter, wash with water until filtrate is neutral, wash with 500 mL MeOH, wash with 500 mL dichloromethane, air dry in hood, heat to 120° in a flask, cool in a desiccator, add 3 mL dichlorodimethylsilane, mix

well, let stand at room temperature for 4 h, add 500 mL MeOH, mix, let stand for 15 min, filter, wash with isopropanol until neutral, air dry in hood, dry at 105° for 2 h, cool in desiccator, store in stoppered container. Totally silanized Celite should float on water and appear yellow (not pink) in toluene saturated with methyl red (J. Assoc. Off.Anal. Chem. 1980, 63, 1114).)

HPLC VARIABLES
Guard column: 70 × 2.1 25-37 μm Co-Pell ODS
Column: 250 × 4.6 6 μm Zorbax C8
Mobile phase: Gradient. MeCN:water from 12:88 to 70:30 over 30 min, 100:0 for 5 min.
Column temperature: 35
Flow rate: 1.5
Injection volume: 10
Detector: F ex 288 em 330 following post-column reaction. The column effluent mixed with 200 mM NaOH pumped at 0.5 mL/min and flowed through a 3 m × 0.48 mm stainless steel column to the detector.

CHROMATOGRAM
Retention time: 35
Limit of quantitation: 50 ppb

OTHER SUBSTANCES
Extracted: carbaryl, carbofuran, napropamide, phosalone

KEY WORDS
post-column reaction; pears; green beans

REFERENCE
Krause,R.T.; August,E.M. Applicability of a carbamate insecticide multiresidue method for determining additional types of pesticides in fruits and vegetables, *J.Assoc.Off.Anal.Chem.*, **1983**, *66*, 234–240.

SAMPLE
Matrix: rice
Sample preparation: 30 g Rice + 50 mL acetone, let stand with occasional shaking for 48 h, evaporate a 1 mL aliquot to near dryness under a stream of nitrogen, shake the remaining few drops twice with 1 mL portions of hexane. Add the hexane extracts to a Florisil Sep-Pak SPE cartridge, elute with 3 mL acetone:hexane 15:85. Collect all the eluates and evaporate them to dryness under a stream of nitrogen, reconstitute the residue in 1 mL MeOH, inject a 100 μL aliquot on to column A and elute to waste with mobile phase A, after 30 s elute the contents of column A onto column B with mobile phase B, elute with mobile phase B and monitor the effluent from column B.

HPLC VARIABLES
Column: A Guard Pak; B 150 × 3.9 Novapak C18
Mobile phase: A MeCN:water 40:60; B MeCN:water 75:25
Flow rate: 1
Injection volume: 100
Detector: UV 225

CHROMATOGRAM
Limit of detection: 50 ng/mL

OTHER SUBSTANCES
Extracted: bioremethrin, deltamethrin, fenvalerate, permethrin, phenothrin

KEY WORDS
column-switching; SPE

REFERENCE
Haddad,P.R.; Brayan,J.G.; Sharp,G.J.; Dilli,S.; Desmarchelier,J.M. Determination of pyrethroid residues on paddy rice by reversed-phase high-performance liquid chromatography, *J.Chromatogr.*, **1989**, *461*, 337–346.

SAMPLE
Matrix: rice
Sample preparation: 30 g Rice + 50 mL acetone, let stand with occasional shaking for 48 h, inject a 10 μL aliquot.

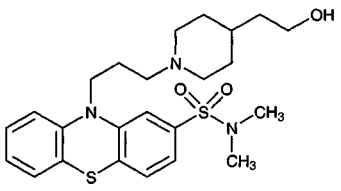
HPLC VARIABLES
Guard column: Guard Pak
Column: 150 × 3.9 Novapak C18
Mobile phase: MeCN:water 75:25
Flow rate: 1
Injection volume: 10
Detector: UV 225

CHROMATOGRAM
Retention time: 5.5
Limit of detection: 1.7 μg/g

OTHER SUBSTANCES
Extracted: bioremethrin, deltamethrin, fenvalerate, permethrin, phenothrin

REFERENCE
Haddad,P.R.; Brayan,J.G.; Sharp,G.J.; Dilli,S.; Desmarchelier,J.M. Determination of pyrethroid residues on paddy rice by reversed-phase high-performance liquid chromatography, *J.Chromatogr.*, **1989**, *461*, 337–346.

Pipotiazine



Molecular formula: $C_{24}H_{33}N_3O_3S_2$
Molecular weight: 475.68
CAS Registry No.: 39860-99-6, 37517-26-3 (palmitic ester)
Merck Index: 7636

SAMPLE
Matrix: blood, urine
Sample preparation: Add 1 mL whole blood or urine to Toxi-Tube A (Toxi-Lab, Irvine CA), add 3 mL water, mix by gentle inversion for 5 min, centrifuge at 1500 g for 5 min. Remove the organic layer and evaporate it to dryness under a stream of nitrogen at 40°, reconstitute the residue with 50 μL MeCN:water 50:50, vortex for 10 s, centrifuge at 7500 g for 2 min, inject a 10 (urine) or 30 (blood) μL aliquot. (The detector wavelength shown is the wavelength of maximum absorbance. This will not necessarily be the optimal wavelength for the separation. Multiple wavelengths from 200-350 nm can be scanned using a diode-array detector. Otherwise, 220 nm may be a reasonable choice for initial work. Matrix may interfere.)

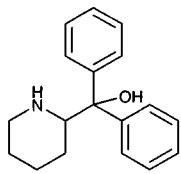
HPLC VARIABLES
Guard column: 20 mm long Symmetry C18
Column: 250 × 4.6 5 μm Symmetry C8 (Waters)
Mobile phase: Gradient. A was 50 mM pH 3.8 sodium phosphate buffer. B was MeCN. A:B 85:15 for 6.5 min, 65:35 for 18.5 min, 20:80 for 3 min (step gradient), re-equilibrate at initial conditions for 7 min.
Column temperature: 30
Flow rate: 1 for 6.5 min, to 1.5 over 18.5 min, maintain at 1.5 for 3 min (re-equilibrate at 1.5 mL/min)
Injection volume: 10-30
Detector: UV 262.9

CHROMATOGRAM
Retention time: 14.695

KEY WORDS
whole blood

REFERENCE
Gaillard,Y.; Pépin,G. Use of high-performance liquid chromatography with photodiode-array UV detection for the creation of a 600-compound library. Application to forensic toxicology, *J.Chromatogr.A*, **1997**, *763*, 149–163.

Pipradrol



Molecular formula: $C_{18}H_{21}NO$
Molecular weight: 267.37
CAS Registry No.: 467-60-7, 71-78-3 (HCl)
Merck Index: 7638
Lednicer No.: 1 47

SAMPLE
Matrix: solutions
Sample preparation: Prepare a 10 μg/mL solution in MeOH, inject a 20 μL aliquot.

HPLC VARIABLES
Column: 125 × 4.9 Spherisorb S5W silica
Mobile phase: MeOH containing 10 mM ammonium perchlorate and 1 mL/L 100 mM NaOH in MeOH, pH 6.7
Flow rate: 2
Injection volume: 20
Detector: E, LeCarbone, V25 glassy carbon electrode, + 1.2 V

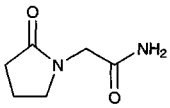
CHROMATOGRAM
Retention time: 2.0

OTHER SUBSTANCES
Also analyzed: acebutolol, acepromazine, acetophenazine, N-acetylprocainamide, albuterol, alprenolol, amethocaine, amiodarone, amitriptyline, antazoline, atenolol, azacyclonal, bamethan, benactyzine, benperidol, benzethidine, benzocaine, benzoctamine, benzphetamine, benzquinamide, bromhexine, bromodiphenhydramine, bromperidol, brompheniramine, brompromazine, buclizine, bufotenine, bupivacaine, buprenorphine, butacaine, butethamate, chlorcyclizine, chlorpheniramine, chlorphenoxamine, chlorprenaline, chlorpromazine, chlorprothixene, cimetidine, cinchonidine, cinnarizine, clemastine, clomipramine, clonidine, cocaine, cyclazocine, cyclizine, cyclopentamine, cyproheptadine, deserpidine, desipramine, dextromoramide, dextropropoxyphene, dicyclomine, diethylcarbamazine, diethylpropion, diethylthiambutene, dihydroergotamine, dimethindene, dimethothiazine, diphenhydramine, diphenoxylate, dipipanone, diprenorphine, dipyridamole, disopyramide, dothiepin, doxapram, doxepin, doxylamine, droperidol, ephedrine, ergocornine, ergocristine, ergocristinine, ergocryptine, ergometrine, ergosine, ergosinine, ergotamine, ethopropazine, etorphine, etoxeridine, fenethazine, fenfluramine, fenoterol, fentanyl, flavoxate, fluopromazine, flupenthixol, fluphenazine, flurazepam, haloperidol, hydroxyzine, hyoscine, ibogaine, imipramine, indapamine, iprindole, isothipendyl, isoxsuprine, ketanserin, laudanosine, lidocaine, lofepramine, loxapine, maprotiline, mecamylamine, meclophenoxate, meclozine, medazepam, mephentermine, mepivacaine, meptazinol, mepyramine, mesoridazine, metaraminol, methadone, methamphetamine, methapyrilene, methdilazene, methotrimeprazine, methoxamine, methoxyphenamine, methoxypromazine, methylephedrine, methylergonovine, methysergide, metoclopramide, metopimazine, metoprolol, mianserin, morazone, nadolol, nalorphine, naloxone, naphazoline, nicotine, nifedipine, nomifensine, nortriptyline, noscapine, orphenadrine, oxeladin, oxprenolol, oxymetazolin, papaverine, pargyline, pecazine, penbutolol, pentazocine, penthienate, pericyazine, perphenazine, phenadoxone, phenampromide, phenazocine, phenbutrazate, phendimetrazine, phenelzine, phenglutarimide, phenindamine, pheniramine, phenmetrazine, phenomorphan, phenoperidine, phenothiazine, phenoxybenzamine, phentolamine, phenylephrine, phenyltoloxamine, physo-

stigmine, piminodine, pimozide, pindolol, pipamazine, pipazethate, piperacetazine, piperidolate, pirenzepine, piritramide, pizotifen, practolol, pramoxine, prazosin, prenylamine, prilocaine, primaquine, proadifen, procainamide, procaine, prochlorperazine, procyclidine, proheptazine, prolintane, promazine, promethazine, pronethalol, properidine, propiomazine, propranolol, prothipendyl, protriptyline, proxymetacaine, pseudoephedrine, pyrimethamine, quinidine, quinine, ranitidine, rescinnamine, sotalol, tacrine, terazosin, terbutaline, terfenadine, thenyldiamine, theophylline, thiethylperazine, thiopropazate, thioproperazine, thioridazine, thiothixene, thonzylamine, timolol, tocainide, tolpropamine, tolycaine, tranylcypromine, trazodone, trifluoperazine, trifluperidol, trimeperidine, trimeprazine, trimethobenzamide, trimethoprim, trimipramine, tripelennamine, triprolidine, tryptamine, verapamil, xylometazoline

REFERENCE
Jane,I.; McKinnon,A.; Flanagan,R.J. High-performance liquid chromatographic analysis of basic drugs on silica columns using non-aqueous ionic eluents. II. Application of UV, fluorescence and electrochemical oxidation detection, *J.Chromatogr.*, **1985**, *323*, 191–225.

Piracetam



Molecular formula: $C_6H_{10}N_2O_2$
Molecular weight: 142.16
CAS Registry No.: 7491-74-9
Merck Index: 7641

SAMPLE
Matrix: blood, urine
Sample preparation: Urine. Dilute sample with MeOH:water 50:50, inject a 100 μL aliquot. Serum. Mix 1 mL serum with 8 mL cold MeOH:dichloromethane 10:40, centrifuge at 3000-5000 rpm for 20 min. Remove the upper MeOH-water layer and add it to 9.5 mL cold MeOH. Cool a 2 mL sample at 8° for 20 min, centrifuge for 10 min, dry the clear MeOH/water residue at 60° under a stream of nitrogen. Extract the residue three times with 100 μL MeOH:dichloromethane 20:80, inject a 100 μL aliquot.

HPLC VARIABLES
Column: 125 5 μm LiChrospher 60 RP-Select-B
Flow rate: 0.8
Injection volume: 100
Detector: UV 218, UV 212

CHROMATOGRAM
Limit of quantitation: 100 μg/mL (urine), 4 μg/mL (serum)

KEY WORDS
serum

REFERENCE
Bockhard,H.; Oelschläger,H.; Pooth,R. Rasche dünnschicht-densitometrische Bestimmung des Nootropikums Piracetam in biologischem Material [Fast detection of the nootropic drug piracetam in biological fluids], *Pharmazie*, **1997**, *52*, 357–361.

SAMPLE
Matrix: blood, urine
Sample preparation: Add 1 mL whole blood or urine to Toxi-Tube A (Toxi-Lab, Irvine CA), add 3 mL water, mix by gentle inversion for 5 min, centrifuge at 1500 g for 5 min. Remove the organic layer and evaporate it to dryness under a stream of nitrogen at 40°, reconstitute the residue with 50 μL MeCN:water 50:50, vortex for 10 s, centrifuge at 7500 g for 2 min, inject a 10 (urine) or 30 (blood) μL aliquot. (The detector wavelength shown is the wavelength of maximum absorbance. This will not necessarily be the optimal wavelength for the separation.

Multiple wavelengths from 200-350 nm can be scanned using a diode-array detector. Otherwise, 220 nm may be a reasonable choice for initial work. Matrix may interfere.)

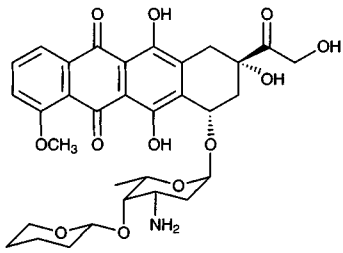
HPLC VARIABLES
Guard column: 20 mm long Symmetry C18
Column: 250 × 4.6 5 μm Symmetry C8 (Waters)
Mobile phase: Gradient. A was 50 mM pH 3.8 sodium phosphate buffer. B was MeCN. A:B 85:15 for 6.5 min, 65:35 for 18.5 min, 20:80 for 3 min (step gradient), re-equilibrate at initial conditions for 7 min.
Column temperature: 30
Flow rate: 1 for 6.5 min, to 1.5 over 18.5 min, maintain at 1.5 for 3 min (re-equilibrate at 1.5 mL/min)
Injection volume: 10-30
Detector: UV 200.5

CHROMATOGRAM
Retention time: 3.295

KEY WORDS
whole blood

REFERENCE
Gaillard,Y.; Pépin,G. Use of high-performance liquid chromatography with photodiode-array UV detection for the creation of a 600-compound library. Application to forensic toxicology, *J.Chromatogr.A*, **1997**, *763*, 149–163.

Pirarubicin



Molecular formula: $C_{32}H_{37}NO_{12}$
Molecular weight: 627.65
CAS Registry No.: 72496-41-4
Merck Index: 7642

SAMPLE
Matrix: blood
Sample preparation: 1 mL Plasma or blood + 3 mL 100 mM pH 9.5 ammonia-ammonium chloride buffer + 20 ng daunorubicin + 13.5 mL chloroform:MeOH 2:1, shake mechanically for 30 min, centrifuge at 3000 g for 10 min, repeat the extraction with 9 mL chloroform. Combine the organic layers and evaporate them to dryness under a stream of nitrogen at 30°, reconstitute the residue in 3 mL chloroform:MeOH 2:1, evaporate this mixture, reconstitute the residue in 300 μL mobile phase, centrifuge a 75 μL aliquot at 10000 g for 1 min, inject the supernatant.

HPLC VARIABLES
Column: 250 × 4 5 μm STR ODS-M (Shimadzu)
Mobile phase: MeCN:buffer 30:70 (Buffer was 200 mM acetic acid-ammonium formate, pH 4.0.)
Column temperature: 22
Flow rate: 0.7
Injection volume: 75
Detector: F ex 470 em 550

CHROMATOGRAM
Retention time: 24.1
Internal standard: daunorubicin (16.2)
Limit of detection: 0.5 ng/mL

OTHER SUBSTANCES
Extracted: doxorubicin

KEY WORDS
plasma; whole blood; pharmacokinetics

REFERENCE
Nagasawa,K.; Yokoyama,T.; Ohnishi,N.; Iwakawa,S.; Okumura,K.; Kosaka,Y.; Sano,K.; Murakami,R.; Nakamura,H. Pharmacokinetics of pirarubicin in pediatric patients, *J.Pharmacobiodyn.*, **1991**, *14*, 222–230.

SAMPLE
Matrix: blood
Sample preparation: 500 μL Plasma + 250 μL 100 ng/mL daunorubicin in mobile phase, extract with 3 mL MeCN for 10 min, add 100 mg NaCl, shake for 5 min, centrifuge at 995 g for 15 min, let stand at -20° for 1 h. Remove the supernatant and evaporate it to dryness under a stream of nitrogen at 60°, reconstitute the residue in 250 μL mobile phase, inject a 100 μL aliquot.

HPLC VARIABLES
Guard column: 10 × 4.6 10 μm Spherisorb phenyl
Column: 250 × 4.6 5 μm Spherisorb phenyl
Mobile phase: MeCN:30 mM citrate buffer adjusted to pH 4 with formic acid 30:70
Column temperature: 50
Flow rate: 1.5
Injection volume: 100
Detector: F ex 480 em 590

CHROMATOGRAM
Retention time: 10.8
Internal standard: daunorubicin (8.5)
Limit of detection: 1 ng/mL
Limit of quantitation: 5 ng/mL

OTHER SUBSTANCES
Extracted: doxorubicin, doxorubicinol

KEY WORDS
plasma; pharmacokinetics

REFERENCE
Jacquet,J.M.; Galtier,M.; Bressolle,F.; Jourdan,J. A sensitive and reproducible HPLC assay for doxorubicin and pirarubicin, *J.Pharm.Biomed.Anal.*, **1992**, *10*, 343–348.

SAMPLE
Matrix: blood, urine
Sample preparation: 1 mL Plasma or urine + 3 mL 10 mM pH 9.0 ammonium chloride buffer, adjust pH to 9.0 with NaOH, add 6 mL chloroform:MeOH 2:1, shake for 5 min, centrifuge at 12000 g at 4° for 10 min, remove the organic layer, re-adjust the pH of the aqueous layer, repeat the extraction. Combine the organic layers and evaporate them to dryness under a stream of nitrogen, reconstitute the residue in 500 μL mobile phase, inject an aliquot.

HPLC VARIABLES
Column: Nova-Pak C18 phenyl
Mobile phase: MeCN:35 mM pH 3.0 ammonium formate buffer 35:65
Flow rate: 0.8
Detector: F ex 254 em 550

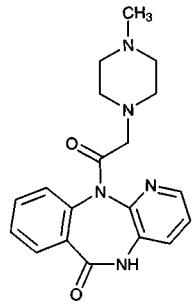
CHROMATOGRAM
Retention time: 8

OTHER SUBSTANCES
Extracted: doxorubicin, metabolites

KEY WORDS
plasma; SPE

REFERENCE
Raber,M.N.; Newman,R.A.; Lu,K.; Legha,S.; Gorski,C.; Benjamin,R.S.; Krakoff,I.H. Phase I clinical trial and pharmacokinetic evaluation of 4'-O-tetrahydropyranyladriamycin (THP-adriamycin), *Cancer Chemother.Pharmacol.*, **1989**, *23*, 311–315.

Pirenzepine



Molecular formula: $C_{19}H_{21}N_5O_2$
Molecular weight: 351.41
CAS Registry No.: 28797-61-7, 29868-97-1 (2.HCl)
Merck Index: 7646

SAMPLE
Matrix: solutions
Sample preparation: Prepare a 10 μg/mL solution in MeOH, inject a 20 μL aliquot.

HPLC VARIABLES
Column: 125 × 4.9 Spherisorb S5W silica
Mobile phase: MeOH containing 10 mM ammonium perchlorate and 1 mL/L 100 mM NaOH in MeOH, pH 6.7
Flow rate: 2
Injection volume: 20
Detector: E, LeCarbone, V25 glassy carbon electrode, + 1.2 V

CHROMATOGRAM
Retention time: 3.3

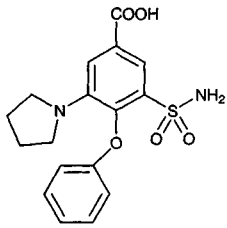
OTHER SUBSTANCES
Also analyzed: acebutolol, acepromazine, acetophenazine, N-acetylprocainamide, albuterol, alprenolol, amethocaine, amiodarone, amitriptyline, antazoline, atenolol, azacyclonal, bamethan, benactyzine, benperidol, benzethidine, benzocaine, benzoctamine, benzphetamine, benzquinamide, bromhexine, bromodiphenhydramine, bromperidol, brompheniramine, brompromazine, buclizine, bufotenine, bupivacaine, buprenorphine, butacaine, butethamate, chlorcyclizine, chlorpheniramine, chlorphenoxamine, chlorprenaline, chlorpromazine, chlorprothixene, cimetidine, cinchonidine, cinnarizine, clemastine, clomipramine, clonidine, cocaine, cyclazocine, cyclizine, cyclopentamine, cyproheptadine, deserpidine, desipramine, dextromoramide, dextropropoxyphene, dicyclomine, diethylcarbamazine, diethylpropion, diethylthiambutene, dihydroergotamine, dimethindene, dimethothiazine, diphenhydramine, diphenoxylate, dipipanone, diprenorphine, dipyridamole, disopyramide, dothiepin, doxapram, doxepin, doxylamine, droperidol, ephedrine, ergocornine, ergocristine, ergocristinine, ergocryptine, ergometrine, ergosine, ergosinine, ergotamine, ethopropazine, etorphine, etoxeridine, fenethazine, fenfluramine, fenoterol, fentanyl, flavoxate, fluopromazine, flupenthixol, fluphenazine, flurazepam, haloperidol, hydroxyzine, hyoscine, ibogaine, imipramine, indapamine, iprindole, isothipendyl, isoxsuprine, ketanserin, laudanosine, lidocaine, lofepramine, loxapine, maprotiline, mecamylamine, meclophenoxate, meclozine, medazepam, mephentermine, mepivacaine, meptazinol, mepyramine, mesoridazine, metaraminol, methadone, methamphetamine, methapyrilene, methdilazene, methotrimeprazine, methoxamine, methoxyphenamine, methoxypromazine, methylephedrine, methylergonovine, methysergide, metoclopramide, metopimazine, metopro-

lol, mianserin, morazone, nadolol, nalorphine, naloxone, naphazoline, nicotine, nifedipine, nomifensine, nortriptyline, noscapine, orphenadrine, oxeladin, oxprenolol, oxymetazolin, papaverine, pargyline, pecazine, penbutolol, pentazocine, penthienate, pericyazine, perphenazine, phenadoxone, phenampromide, phenazocine, phenbutrazate, phendimetrazine, phenelzine, phenglutarimide, phenindamine, pheniramine, phenmetrazine, phenomorphan, phenoperidine, phenothiazine, phenoxybenzamine, phentolamine, phenylephrine, phenyltoloxamine, physostigmine, piminodine, pimozide, pindolol, pipamazine, pipazethate, piperacetazine, piperidolate, pipradol, piritramide, pizotifen, practolol, pramoxine, prazosin, prenylamine, prilocaine, primaquine, proadifen, procainamide, procaine, prochlorperazine, procyclidine, proheptazine, prolintane, promazine, promethazine, pronethalol, properidine, propiomazine, propranolol, prothipendyl, protriptyline, proxymetacaine, pseudoephedrine, pyrimethamine, quinidine, quinine, ranitidine, rescinnamine, sotalol, tacrine, terazosin, terbutaline, terfenadine, thenyldiamine, theophylline, thiethylperazine, thiopropazate, thioproperazine, thioridazine, thiothixene, thonzylamine, timolol, tocainide, tolpropamine, tolycaine, tranylcypromine, trazodone, trifluoperazine, trifluperidol, trimeperidine, trimeprazine, trimethobenzamide, trimethoprim, trimipramine, tripelennamine, triprolidine, tryptamine, verapamil, xylometazoline

REFERENCE

Jane,I.; McKinnon,A.; Flanagan,R.J. High-performance liquid chromatographic analysis of basic drugs on silica columns using non-aqueous ionic eluents. II. Application of UV, fluorescence and electrochemical oxidation detection, *J.Chromatogr.*, **1985**, *323*, 191–225.

Piretanide



Molecular formula: $C_{17}H_{18}N_2O_5S$
Molecular weight: 362.41
CAS Registry No.: 55837-27-9
Merck Index: 7647
Lednicer No.: 3 58

SAMPLE

Matrix: blood, urine

Sample preparation: Add 1 mL whole blood or urine to Toxi-Tube A (Toxi-Lab, Irvine CA), add 3 mL water, mix by gentle inversion for 5 min, centrifuge at 1500 g for 5 min. Remove the organic layer and evaporate it to dryness under a stream of nitrogen at 40°, reconstitute the residue with 50 μL MeCN:water 50:50, vortex for 10 s, centrifuge at 7500 g for 2 min, inject a 10 (urine) or 30 (blood) μL aliquot. (The detector wavelength shown is the wavelength of maximum absorbance. This will not necessarily be the optimal wavelength for the separation. Multiple wavelengths from 200-350 nm can be scanned using a diode-array detector. Otherwise, 220 nm may be a reasonable choice for initial work. Matrix may interfere.)

HPLC VARIABLES

Guard column: 20 mm long Symmetry C18
Column: 250 × 4.6 5 μm Symmetry C8 (Waters)
Mobile phase: Gradient. A was 50 mM pH 3.8 sodium phosphate buffer. B was MeCN. A:B 85:15 for 6.5 min, 65:35 for 18.5 min, 20:80 for 3 min (step gradient), re-equilibrate at initial conditions for 7 min.
Column temperature: 30
Flow rate: 1 for 6.5 min, to 1.5 over 18.5 min, maintain at 1.5 for 3 min (re-equilibrate at 1.5 mL/min)
Injection volume: 10-30
Detector: UV 200.5

CHROMATOGRAM

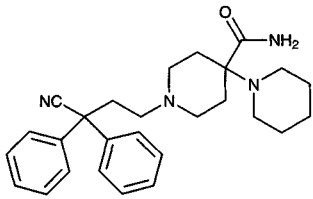
Retention time: 17.8

KEY WORDS

whole blood

REFERENCE
Gaillard,Y.; Pépin,G. Use of high-performance liquid chromatography with photodiode-array UV detection for the creation of a 600-compound library. Application to forensic toxicology, *J.Chromatogr.A*, **1997**, *763*, 149–163.

Piritramide



Molecular formula: $C_{27}H_{34}N_4O$
Molecular weight: 430.59
CAS Registry No.: 302-41-0
Merck Index: 7653
Lednicer No.: 1 308

SAMPLE
Matrix: solutions
Sample preparation: Prepare a 10 μg/mL solution in MeOH, inject a 20 μL aliquot.

HPLC VARIABLES
Column: 125 × 4.9 Spherisorb S5W silica
Mobile phase: MeOH containing 10 mM ammonium perchlorate and 1 mL/L 100 mM NaOH in MeOH, pH 6.7
Flow rate: 2
Injection volume: 20
Detector: E, LeCarbone, V25 glassy carbon electrode, + 1.2 V

CHROMATOGRAM
Retention time: 1.4

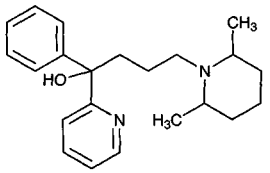
OTHER SUBSTANCES
Also analyzed: acebutolol, acepromazine, acetophenazine, N-acetylprocainamide, albuterol, alprenolol, amethocaine, amiodarone, amitriptyline, antazoline, atenolol, azacyclonal, bamethan, benactyzine, benperidol, benzethidine, benzocaine, benzoctamine, benzphetamine, benzquinamide, bromhexine, bromodiphenhydramine, bromperidol, brompheniramine, brompromazine, buclizine, bufotenine, bupivacaine, buprenorphine, butacaine, butethamate, chlorcyclizine, chlorpheniramine, chlorphenoxamine, chlorprenaline, chlorpromazine, chlorprothixene, cimetidine, cinchonidine, cinnarizine, clemastine, clomipramine, clonidine, cocaine, cyclazocine, cyclizine, cyclopentamine, cyproheptadine, deserpidine, desipramine, dextromoramide, dextropropoxyphene, dicyclomine, diethylcarbamazine, diethylpropion, diethylthiambutene, dihydroergotamine, dimethindene, dimethothiazine, diphenhydramine, diphenoxylate, dipipanone, diprenorphine, dipyridamole, disopyramide, dothiepin, doxapram, doxepin, doxylamine, droperidol, ephedrine, ergocornine, ergocristine, ergocristinine, ergocryptine, ergometrine, ergosine, ergosinine, ergotamine, ethopropazine, etorphine, etoxeridine, fenethazine, fenfluramine, fenoterol, fentanyl, flavoxate, fluopromazine, flupenthixol, fluphenazine, flurazepam, haloperidol, hydroxyzine, hyoscine, ibogaine, imipramine, indapamine, iprindole, isothipendyl, isoxsuprine, ketanserin, laudanosine, lidocaine, lofepramine, loxapine, maprotiline, mecamylamine, meclophenoxate, meclozine, medazepam, mephentermine, mepivacaine, meptazinol, mepyramine, mesoridazine, metaraminol, methadone, methamphetamine, methapyrilene, methdilazene, methotrimeprazine, methoxamine, methoxyphenamine, methoxypromazine, methylephedrine, methylergonovine, methysergide, metoclopramide, metopimazine, metoprolol, mianserin, morazone, nadolol, nalorphine, naloxone, naphazoline, nicotine, nifedipine, nomifensine, nortriptyline, noscapine, orphenadrine, oxeladin, oxprenolol, oxymetazolin, papaverine, pargyline, pecazine, penbutolol, pentazocine, penthienate, pericyazine, perphenazine, phenadoxone, phenampromide, phenazocine, phenbutrazate, phendimetrazine, phenelzine, phenglutarimide, phenindamine, pheniramine, phenmetrazine, phenomorphan, phenoperidine, phenothiazine, phenoxybenzamine, phentolamine, phenylephrine, phenyltoloxamine, physostigmine, piminodine, pimozide, pindolol, pipamazine, pipazethate, piperacetazine, piperidolate, pipradol, pirenzepine, pizotifen, practolol, pramoxine, prazosin, prenylamine, prilocaine, primaquine, proadifen, procainamide, procaine, prochlorperazine, procyclidine, proheptazine, prolintane, promazine, promethazine, pronethalol, properidine, propiomazine, propranolol, pro-

thipendyl, protriptyline, proxymetacaine, pseudoephedrine, pyrimethamine, quinidine, quinine, ranitidine, rescinnamine, sotalol, tacrine, terazosin, terbutaline, terfenadine, thenyldiamine, theophylline, thiethylperazine, thiopropazate, thioproperazine, thioridazine, thiothixene, thonzylamine, timolol, tocainide, tolpropamine, tolycaine, tranylcypromine, trazodone, trifluoperazine, trifluperidol, trimeperidine, trimeprazine, trimethobenzamide, trimethoprim, trimipramine, tripelennamine, triprolidine, tryptamine, verapamil, xylometazoline

REFERENCE

Jane,I.; McKinnon,A.; Flanagan,R.J. High-performance liquid chromatographic analysis of basic drugs on silica columns using non-aqueous ionic eluents. II. Application of UV, fluorescence and electrochemical oxidation detection, *J.Chromatogr.*, **1985**, *323*, 191–225.

Pirmenol



Molecular formula: $C_{22}H_{30}N_2O$
Molecular weight: 338.49
CAS Registry No.: 68252-19-7, 61477-94-9 (HCl)
Merck Index: 7656
Lednicer No.: 3 48

SAMPLE

Matrix: blood
Sample preparation: 1 mL Serum + 150 μL 1 M NaOH + 50 μL 40 μg/mL chlorodisopyramide in MeOH + 5 mL dichloromethane, shake (Labquake) for 10 min, centrifuge at 1000 g for 10 min. Remove the organic layer (avoid contamination with aqueous phase) and evaporate it to dryness under a stream of nitrogen at 40°, reconstitute the residue in 200 μL mobile phase, inject a 100 μL aliquot.

HPLC VARIABLES

Column: 250 × 4 5 μm C18 (Altex) (At the beginning of each series of analyses use a conditioning injection of 4 μg pirmenol and IS.)
Mobile phase: MeCN:buffer 6:94 (Buffer was 10 mM K_2HPO_4 adjusted to pH 2.4 using phosphoric acid containing 375 μL nonylamine.)
Flow rate: 2
Injection volume: 100
Detector: UV 210

CHROMATOGRAM

Retention time: 2.9
Internal standard: chlorodisopyramide (3.6)
Limit of detection: 5 ng/mL

OTHER SUBSTANCES

Noninterfering: acetaminophen, N-acetylprocainamide, amikacin, amitriptyline, carbamazepine, chloramphenicol, desipramine, digoxin, disopyramide, ethosuximide, gentamicin, imipramine, lidocaine, lithium, methotrexate, netilmicin, nortriptyline, phenobarbital, phenytoin, primidone, procainamide, propranolol, quinidine, salicylic acid, theophylline, tobramycin, valproic acid, vancomycin

KEY WORDS

serum

REFERENCE

Hoyer,G.L. Pirmenol determination by high-performance liquid chromatography, *J.Chromatogr.*, **1991**, *565*, 497–503.

SAMPLE

Matrix: blood

Sample preparation: 500 μL Plasma + 100 μL 10 mM HCl + 100 μL 2.5 μg/mL (+)-propranolol in 10 mM HCl + 200 μL 1 M NaOH + 5 mL toluene, shake for 10 min, centrifuge at 750 g for 5 min, freeze in dry ice/acetone. Remove the toluene layer and add it to 500 μL 100 mM HCl, shake for 10 min, centrifuge at 420 g for 5 min, freeze in dry ice/acetone. Discard the toluene layer and thaw the aqueous layer, add 200 μL 1 M NaOH to the aqueous layer, add hexane, shake for 10 min, centrifuge at 420 g for 5 min, freeze in dry ice/acetone. Remove the organic layer and evaporate it to dryness under a stream of nitrogen, reconstitute the residue in 200 μL mobile phase, inject a 175 μL aliquot.

HPLC VARIABLES

Column: 250 × 4.6 10 μm Chiralcel OJ
Mobile phase: Hexane:isopropanol:diethylamine 98.9:1:0.1
Column temperature: 65
Flow rate: 1
Injection volume: 175
Detector: UV 262

CHROMATOGRAM

Retention time: 7.4 (+), 9.2 (-)
Internal standard: (+)-propranolol hydrochloride (20.9)
Limit of quantitation: 20 ng/mL

KEY WORDS

dog; plasma; chiral; pharmacokinetics

REFERENCE

Janiczek,N.; Bockbrader,H.N.; Chang,T.; Amidon,G.L.; Smith,D.E. Stereoselective high-performance liquid chromatographic assay for pirmenol enantiomers in dog plasma, *J.Chromatogr.*, **1991**, *571*, 179–187.

SAMPLE

Matrix: blood, urine
Sample preparation: Blood. Mix 500 μL whole blood or plasma with 50 μL 20 μg/mL IS in 10 mM phosphoric acid, 100 μL 1 M NaOH, and 4 mL diethyl ether. Extract using a Labquake automatic shaker for 10 min, centrifuge at 1000 g for 5 min. Freeze the aqueous phase and remove the organic phase. Add 80 μL 100 mM phosphoric acid to the organic phase, vortex for 40 s, centrifuge, inject a 50 μL aliquot of the aqueous layer. Urine. Mix 500 μL urine with 50 μL 20 μg/mL IS in 10 mM phosphoric acid, 2 mL 100 mM sodium carbonate, and 4 mL diethyl ether. Extract using a Labquake automatic shaker for 10 min, centrifuge at 1000 g for 5 min. Freeze the aqueous phase and remove the organic phase. Add 80 μL 100 mM phosphoric acid to the organic layer, vortex for 40 s, centrifuge, inject a 50 μL aliquot of the aqueous layer.

HPLC VARIABLES

Column: 250 × 4.6 6 μm Zorbax TMS
Mobile phase: MeCN:triethylamine:50 mM ammonium dihydrogen phosphate 15:0.5:85, adjusted to pH 2.6 with 1 M phosphoric acid
Flow rate: 1.1
Injection volume: 50
Detector: UV 262

CHROMATOGRAM

Retention time: 5
Internal standard: disopyramide (11)
Limit of quantitation: 100 ng/mL (blood, plasma), 5 μg/mL (urine)

KEY WORDS

plasma; whole blood

REFERENCE

Shand,D.G.; Verghese,C.; Barchowsky,A.; Hammill,S.C.; Pritchett,E.L.C. High-performance liquid chromatographic analysis of a new antiarrhythmic drug, pirmenol, in biological fluids, *J.Chromatogr.B*, **1981**, *224*, 343–347.

SAMPLE
Matrix: blood, urine
Sample preparation: Plasma. 1 mL Plasma + 500 μL 50 mM HCl + 500 μL 3.33 μg/mL IS in 50 mM HCl + 4 mL cyclohexane + 150 μL 1 M NaOH, shake horizontally for 10 min, centrifuge at 206 g for 5 min. Remove 3 mL of the organic layer and evaporate it to dryness, reconstitute the residue in 200 μL mobile phase, inject a 50 μL aliquot. Urine. 1 mL Urine + 250 μL 50 mM HCl + 4 mL cyclohexane + 200 μL 1 M NaOH, shake horizontally for 10 min, centrifuge at 206 g for 5 min. Remove 3 mL of the organic layer and evaporate it to dryness, reconstitute the residue in 1 mL mobile phase, inject a 100 μL aliquot.

HPLC VARIABLES
Column: 250 × 4.6 6 μm Zorbax TMS
Mobile phase: MeCN:buffer 15:85 (Buffer was 6.9 g $NaH_2PO_4.H_2O$ and 5 mL triethylamine in water, adjust pH to 2.6 with phosphoric acid, make up to 1 L with water.)
Flow rate: 1.5
Injection volume: 50-100
Detector: UV 254

CHROMATOGRAM
Retention time: 6.4
Internal standard: (±)-cis-2-[4-(2,6-dimethyl-1-piperidinyl)-1-phenylbutyl]pyridine monohydrochloride (9.5)
Limit of quantitation: 1 μg/mL (urine), 125 ng/mL (plasma)

OTHER SUBSTANCES
Simultaneous: aspirin, bretylium tosylate, chlorthalidone, naproxen, oxazepam, quinidine salicylic acid, triamterene, zomepirac
Noninterfering: acetaminophen, clonidine, diazepam, disopyramide, ethacrynic acid, fenoprofen, furosemide, hydralazine, hydrochlorothiazide, ibuprofen, methotrimeprazine, methyldopa, prazepam, prazosin, procainamide, propranolol, propoxyphene, reserpine, tolmetin

KEY WORDS
plasma; pharmacokinetics

REFERENCE
Johnson,E.L.; Pachla,L.A. Improved liquid chromatographic assay for the analysis of pirmenol in plasma and urine, *J.Pharm.Sci.*, **1984**, *73*, 754–756.

SAMPLE
Matrix: blood, urine
Sample preparation: Add IS to plasma and urine, extract with cyclohexane. Remove the organic layer and evaporate it to dryness under a stream of nitrogen, reconstitute the residue in mobile phase, inject an aliquot.

HPLC VARIABLES
Column: Zorbax TMS
Mobile phase: MeCN:buffer 15:85 (Buffer was 50 mM pH 2.58 sodium phosphate buffer containing 0.5% triethanolamine.)
Flow rate: 2
Detector: UV 262 (plasma), UV 254 (urine)

CHROMATOGRAM
Internal standard: PD-92038

KEY WORDS
plasma; pharmacokinetics

REFERENCE
Stringer,K.A.; Cetnarowski,A.B.; Goldfarb,A.; Lebsack,M.E.; Chang,T.; Sedman,A.J. Enhanced pirmenol elimination by rifampin, *J.Clin.Pharmacol.*, **1988**, *28*, 1094–1097.

SAMPLE
Matrix: solutions
Sample preparation: Inject an aliquot of a solution in MeOH.

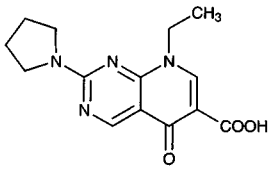
HPLC VARIABLES
Column: 150 × 6 YMC-PAK AM-312 ODS (YMC)
Mobile phase: Gradient. MeCN:50 mM pH 7.2 ammonium phosphate buffer 10:88:2 for 10 min, 17.5:80.5:2 for 5 min, 25:73:2 for 12 min, 40:58:2 for 13 min (step gradient (?)).
Column temperature: 45
Flow rate: 1 for 27 min then 1.2 for 13 min
Detector: UV 254

CHROMATOGRAM
Retention time: 20

OTHER SUBSTANCES
Simultaneous: degradation products

REFERENCE
Sakano,I.; Ishii,T.; Ichikawa,S.; Harasawa,K.; Minohara,K.; Yamamura,S.; Nishiyama,S. Isolation and structure elucidation of the major photodegradation products of pirmenol hydrochloride, *J.Pharm.Sci.*, **1994**, *83*, 1363–1366.

Piromidic acid



Molecular formula: $C_{14}H_{16}N_4O_3$
Molecular weight: 288.31
CAS Registry No.: 19562-30-2
Merck Index: 7660

SAMPLE
Matrix: urine
Sample preparation: Make up 1 mL urine to 25 mL with mobile phase, filter (0.45 μm). Inject a 20 μL aliquot.

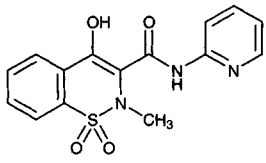
HPLC VARIABLES
Column: 150 × 3.9 Nova-Pak C18
Mobile phase: MeCN:400 μM oxalic acid in water 28:72
Flow rate: 2.0
Injection volume: 20
Detector: UV 265

CHROMATOGRAM
Retention time: 8.51
Limit of detection: 1.02 μg/mL

OTHER SUBSTANCES
Simultaneous: cinoxacin, nalidixic acid, oxolinic acid, pipemidic acid,

REFERENCE
Durán Mer,I.; Galeano Díaz,T.; Rodríguez Cáceres,M.I.; Salinas López,F. Determination of the chemotherapeutic quinolonic and cinolonic derivatives in urine by high-performance liquid chromatography with ultraviolet and fluorescence detection in series, *J.Chromatogr.A*, **1997**, *787*, 119–127.

Piroxicam



Molecular formula: $C_{15}H_{13}N_3O_4S$
Molecular weight: 331.35
CAS Registry No.: 36322-90-4, 87234-24-0 (cinnamic acid ester), 85056-47-9 (piroxicam olamine)
Merck Index: 7661
Lednicer No.: 4 173

SAMPLE

Matrix: blood
Sample preparation: 1 mL Plasma + 50 μL 40 μg/mL tenoxicam in MeOH + 1 mL pH 2 phosphate buffer + 10 mL diethyl ether, vortex for 1 min, centrifuge at 1300 g for 5 min. Evaporate the organic layer to dryness under a stream of nitrogen. Reconstitute the residue with 100 μL 10 mM HCl in MeOH, inject a 40 μL aliquot.

HPLC VARIABLES

Column: 300 × 3.9 10 μm μBondapak ODS
Mobile phase: MeOH:10 mM pH 2 phosphate buffer 45:55
Flow rate: 1.5
Injection volume: 40
Detector: UV 361

CHROMATOGRAM

Retention time: 9.85
Internal standard: tenoxicam (5.81)
Limit of detection: 20 ng/mL
Limit of quantitation: 200 ng/mL

KEY WORDS

plasma; rat

REFERENCE

Amanlou,M.; Dehpour,A.R. Rapid method for the determination of piroxicam in rat plasma using high-performance liquid chromatography, *J.Chromatogr.B*, **1997**, *696*, 317–319.

SAMPLE

Matrix: blood, urine
Sample preparation: Add 1 mL whole blood or urine to Toxi-Tube A (Toxi-Lab, Irvine CA), add 3 mL water, mix by gentle inversion for 5 min, centrifuge at 1500 g for 5 min. Remove the organic layer and evaporate it to dryness under a stream of nitrogen at 40°, reconstitute the residue with 50 μL MeCN:water 50:50, vortex for 10 s, centrifuge at 7500 g for 2 min, inject a 10 (urine) or 30 (blood) μL aliquot. (The detector wavelength shown is the wavelength of maximum absorbance. This will not necessarily be the optimal wavelength for the separation. Multiple wavelengths from 200-350 nm can be scanned using a diode-array detector. Otherwise, 220 nm may be a reasonable choice for initial work. Matrix may interfere.)

HPLC VARIABLES

Guard column: 20 mm long Symmetry C18
Column: 250 × 4.6 5 μm Symmetry C8 (Waters)
Mobile phase: Gradient. A was 50 mM pH 3.8 sodium phosphate buffer. B was MeCN. A:B 85:15 for 6.5 min, 65:35 for 18.5 min, 20:80 for 3 min (step gradient), re-equilibrate at initial conditions for 7 min.
Column temperature: 30
Flow rate: 1 for 6.5 min, to 1.5 over 18.5 min, maintain at 1.5 for 3 min (re-equilibrate at 1.5 mL/min)
Injection volume: 10-30
Detector: UV 200.5

CHROMATOGRAM

Retention time: 16.57

KEY WORDS
whole blood

REFERENCE
Gaillard,Y.; Pépin,G. Use of high-performance liquid chromatography with photodiode-array UV detection for the creation of a 600-compound library. Application to forensic toxicology, *J.Chromatogr.A*, **1997**, *763*, 149–163.

SAMPLE
Matrix: perfusate
Sample preparation: Mix 1 mL perfusate with 100 μL 1 M HCl, 100 μL 1.5 mg/mL IS solution, and 8 mL diethyl ether. Vortex for 1 min, centrifuge at 3000 rpm for 5 min. Remove the organic layer and evaporate it to dryness under nitrogen. Reconstitute the residue with 2 mL mobile phase. Inject a 30 μL aliquot.

HPLC VARIABLES
Column: 250 × 4.6 5 μm Econosphere C18
Mobile phase: MeOH:40 mM pH 8.0 phosphate buffer 40:60
Injection volume: 30
Detector: UV 330

CHROMATOGRAM
Retention time: 5.2
Internal standard: naproxen (7.5)
Limit of detection: 1 μg/mL

REFERENCE
Takamatsu,N.; Welage,L.S.; Idkaidek,N.M.; Liu,D.Y.; Lee,P.I.-D.; Hayashi,Y.; Rhie,J.K.; Lennernäs,H.; Barnett,J.L.; Shah,V.P.; Lesko,L.; Amidron,G.L. Human intestinal permeability of piroxicam, propranolol, phenylalanine, and PEG 400 determined by jejunal perfusion, *Pharm.Res.*, **1997**, *14*, 1127–1132.

SAMPLE
Matrix: solutions

HPLC VARIABLES
Column: 250 × 4.6 5 μm Ultrasphere C18
Mobile phase: MeOH:10 mM Na_2HPO_4 buffer containing 10 mM citric acid 70:30
Flow rate: 1
Detector: UV 205

REFERENCE
Walter,E.; Janich,S.; Roessler,B.J.; Hilfinger,J.M.; Amidon,G.L. HT29-MTX/Caco-2 cocultures as an in vitro model for the intestinal epithelium: In vitro-in vivo correlation with permeability data from rats and humans, *J.Pharm.Sci.*, **1996**, *85*, 1070–1076.

SAMPLE
Matrix: urine
Sample preparation: Condition a Sep-Pak C18 SPE cartridge with 10 mL ethyl acetate and dry by aspiration of air. Evaporate an aliquot of 100 μL 20 μg/mL IS in MeOH to dryness at 37°. Add 1 mL urine, vortex, add 250 μL 1 M pH 5.0 acetate buffer, vortex. Add 250 μL of the mixture to the SPE cartridge, dry by aspiration of air, elute with 3 mL ethyl acetate, evaporate the eluate to dryness under a stream of nitrogen at 37°, reconstitute the residue in 200 μL mobile phase, inject a 10-30 μL aliquot.

HPLC VARIABLES
Column: 150 × 4.6 5 μm Inertsil ODS-2
Mobile phase: MeCN:50 mM pH 5.0 phosphate buffer 42:58
Flow rate: 0.9
Injection volume: 10-30
Detector: UV 230, UV 320

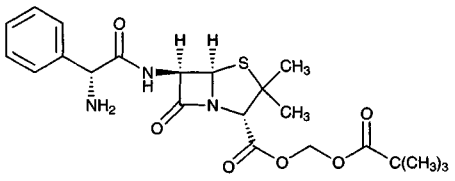
CHROMATOGRAM
Retention time: 5
Internal standard: indomethacin (18.5)
Limit of quantitation: 5 ng/mL

OTHER SUBSTANCES
Extracted: diclofenac, ibuprofen, felbinac, fenbufen, flurbiprofen, ketoprofen, loxoprofen, mefenamic acid, naproxen, sulindac

KEY WORDS
SPE

REFERENCE
Hirai,T.; Matsumoto,S.; Kishi,I. Simultaneous analysis of several non-steroidal anti-inflammatory drugs in human urine by high-performance liquid chromatography with normal solid-phase extraction, *J.Chromatogr.B*, **1997**, *692*, 375–388.

Pivampicillin



Molecular formula: $C_{22}H_{29}N_3O_6S$
Molecular weight: 463.55
CAS Registry No.: 33817-20-8, 26309-95-5 (HCl)
Merck Index: 7669
Lednicer No.: 1 414

SAMPLE
Matrix: blood, urine
Sample preparation: Add 1 mL whole blood or urine to Toxi-Tube A (Toxi-Lab, Irvine CA), add 3 mL water, mix by gentle inversion for 5 min, centrifuge at 1500 g for 5 min. Remove the organic layer and evaporate it to dryness under a stream of nitrogen at 40°, reconstitute the residue with 50 µL MeCN:water 50:50, vortex for 10 s, centrifuge at 7500 g for 2 min, inject a 10 (urine) or 30 (blood) µL aliquot. (The detector wavelength shown is the wavelength of maximum absorbance. This will not necessarily be the optimal wavelength for the separation. Multiple wavelengths from 200-350 nm can be scanned using a diode-array detector. Otherwise, 220 nm may be a reasonable choice for initial work. Matrix may interfere.)

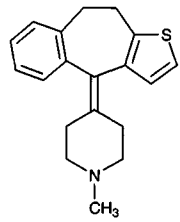
HPLC VARIABLES
Guard column: 20 mm long Symmetry C18
Column: 250 × 4.6 5 µm Symmetry C8 (Waters)
Mobile phase: Gradient. A was 50 mM pH 3.8 sodium phosphate buffer. B was MeCN. A:B 85:15 for 6.5 min, 65:35 for 18.5 min, 20:80 for 3 min (step gradient), re-equilibrate at initial conditions for 7 min.
Column temperature: 30
Flow rate: 1 for 6.5 min, to 1.5 over 18.5 min, maintain at 1.5 for 3 min (re-equilibrate at 1.5 mL/min)
Injection volume: 10-30
Detector: UV 200.5

CHROMATOGRAM
Retention time: 15.813

KEY WORDS
whole blood

REFERENCE
Gaillard,Y.; Pépin,G. Use of high-performance liquid chromatography with photodiode-array UV detection for the creation of a 600-compound library. Application to forensic toxicology, *J.Chromatogr.A*, **1997**, *763*, 149–163.

Pizotyline



Molecular formula: $C_{19}H_{21}NS$
Molecular weight: 295.45
CAS Registry No.: 15574-96-6, 73391-87-4 (HCl)
Merck Index: 7671
Lednicer No.: 2 420

SAMPLE

Matrix: blood, urine
Sample preparation: Add 1 mL whole blood or urine to Toxi-Tube A (Toxi-Lab, Irvine CA), add 3 mL water, mix by gentle inversion for 5 min, centrifuge at 1500 g for 5 min. Remove the organic layer and evaporate it to dryness under a stream of nitrogen at 40°, reconstitute the residue with 50 μL MeCN:water 50:50, vortex for 10 s, centrifuge at 7500 g for 2 min, inject a 10 (urine) or 30 (blood) μL aliquot. (The detector wavelength shown is the wavelength of maximum absorbance. This will not necessarily be the optimal wavelength for the separation. Multiple wavelengths from 200-350 nm can be scanned using a diode-array detector. Otherwise, 220 nm may be a reasonable choice for initial work. Matrix may interfere.)

HPLC VARIABLES

Guard column: 20 mm long Symmetry C18
Column: 250 × 4.6 5 μm Symmetry C8 (Waters)
Mobile phase: Gradient. A was 50 mM pH 3.8 sodium phosphate buffer. B was MeCN. A:B 85:15 for 6.5 min, 65:35 for 18.5 min, 20:80 for 3 min (step gradient), re-equilibrate at initial conditions for 7 min.
Column temperature: 30
Flow rate: 1 for 6.5 min, to 1.5 over 18.5 min, maintain at 1.5 for 3 min (re-equilibrate at 1.5 mL/min)
Injection volume: 10-30
Detector: UV 200.5

CHROMATOGRAM

Retention time: 15.197

KEY WORDS

whole blood

REFERENCE

Gaillard,Y.; Pépin,G. Use of high-performance liquid chromatography with photodiode-array UV detection for the creation of a 600-compound library. Application to forensic toxicology, *J.Chromatogr.A*, **1997**, *763*, 149–163.

SAMPLE

Matrix: solutions
Sample preparation: Prepare a 10 μg/mL solution in MeOH, inject a 20 μL aliquot.

HPLC VARIABLES

Column: 125 × 4.9 Spherisorb S5W silica
Mobile phase: MeOH containing 10 mM ammonium perchlorate and 1 mL/L 100 mM NaOH in MeOH, pH 6.7
Flow rate: 2
Injection volume: 20
Detector: E, LeCarbone, V25 glassy carbon electrode, + 1.2 V

CHROMATOGRAM

Retention time: 4.1

OTHER SUBSTANCES

Also analyzed: acebutolol, acepromazine, acetophenazine, N-acetylprocainamide, albuterol, alprenolol, amethocaine, amiodarone, amitriptyline, antazoline, atenolol, azacyclonal, bamethan,

benactyzine, benperidol, benzethidine, benzocaine, benzoctamine, benzphetamine, benzquinamide, bromhexine, bromodiphenhydramine, bromperidol, brompheniramine, brompromazine, buclizine, bufotenine, bupivacaine, buprenorphine, butacaine, butethamate, chlorcyclizine, chlorpheniramine, chlorphenoxamine, chlorprenaline, chlorpromazine, chlorprothixene, cimetidine, cinchonidine, cinnarizine, clemastine, clomipramine, clonidine, cocaine, cyclazocine, cyclizine, cyclopentamine, cyproheptadine, deserpidine, desipramine, dextromoramide, dextropropoxyphene, dicyclomine, diethylcarbamazine, diethylpropion, diethylthiambutene, dihydroergotamine, dimethindene, dimethothiazine, diphenhydramine, diphenoxylate, dipipanone, diprenorphine, dipyridamole, disopyramide, dothiepin, doxapram, doxepin, doxylamine, droperidol, ephedrine, ergocornine, ergocristine, ergocristinine, ergocryptine, ergometrine, ergosine, ergosinine, ergotamine, ethopropazine, etorphine, etoxeridine, fenethazine, fenfluramine, fenoterol, fentanyl, flavoxate, fluopromazine, flupenthixol, fluphenazine, flurazepam, haloperidol, hydroxyzine, hyoscine, ibogaine, imipramine, indapamine, iprindole, isothipendyl, isoxsuprine, ketanserin, laudanosine, lidocaine, lofepramine, loxapine, maprotiline, mecamylamine, meclophenoxate, meclozine, medazepam, mephentermine, mepivacaine, meptazinol, mepyramine, mesoridazine, metaraminol, methadone, methamphetamine, methapyrilene, methdilazene, methotrimeprazine, methoxamine, methoxyphenamine, methoxypromazine, methylephedrine, methylergonovine, methysergide, metoclopramide, metopimazine, metoprolol, mianserin, morazone, nadolol, nalorphine, naloxone, naphazoline, nicotine, nifedipine, nomifensine, nortriptyline, noscapine, orphenadrine, oxeladin, oxprenolol, oxymetazolin, papaverine, pargyline, pecazine, penbutolol, pentazocine, penthienate, pericyazine, perphenazine, phenadoxone, phenampromide, phenazocine, phenbutrazate, phendimetrazine, phenelzine, phenglutarimide, phenindamine, pheniramine, phenmetrazine, phenomorphan, phenoperidine, phenothiazine, phenoxybenzamine, phentolamine, phenylephrine, phenyltoloxamine, physostigmine, piminodine, pimozide, pindolol, pipamazine, pipazethate, piperacetazine, piperidolate, pipradol, pirenzepine, piritramide, practolol, pramoxine, prazosin, prenylamine, prilocaine, primaquine, proadifen, procainamide, procaine, prochlorperazine, procyclidine, proheptazine, prolintane, promazine, promethazine, pronethalol, properidine, propiomazine, propranolol, prothipendyl, protriptyline, proxymetacaine, pseudoephedrine, pyrimethamine, quinidine, quinine, ranitidine, rescinnamine, sotalol, tacrine, terazosin, terbutaline, terfenadine, thenyldiamine, theophylline, thiethylperazine, thiopropazate, thioproperazine, thioridazine, thiothixene, thonzylamine, timolol, tocainide, tolpropamine, tolycaine, tranylcypromine, trazodone, trifluoperazine, trifluperidol, trimeperidine, trimeprazine, trimethobenzamide, trimethoprim, trimipramine, tripelennamine, triprolidine, tryptamine, verapamil, xylometazoline

REFERENCE

Jane,I.; McKinnon,A.; Flanagan,R.J. High-performance liquid chromatographic analysis of basic drugs on silica columns using non-aqueous ionic eluents. II. Application of UV, fluorescence and electrochemical oxidation detection, *J.Chromatogr.*, **1985**, *323*, 191–225.

SAMPLE

Matrix: solutions

HPLC VARIABLES

Column: 150 × 4.6 12 μm 1-myristoyl-2-[(13-carboxyl)-tridecoyl]-sn-3-glycerophosphocholine chemically bonded to silica (Regis)
Mobile phase: MeCN:100 mM pH 7.0 phosphate buffer 20:80
Flow rate: 1
Detector: UV 254

CHROMATOGRAM

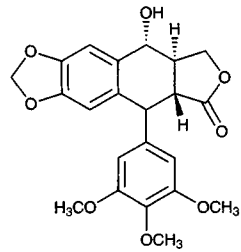
Retention time: k' 38.73

OTHER SUBSTANCES

Also analyzed: acebutolol, alprenolol, antazoline, atenolol, betaxolol, bisoprolol, bopindolol, bupranolol, carteolol, celiprolol, chloropyramine, chlorpheniramine, cicloprolol, cimetidine, cinnarizine, cirazoline, clonidine, dilevalol, dimethindene, diphenhydramine, doxazosin, esmolol, famotidine, isothipendyl, ketotifen, metiamide, metoprolol, moxonidine, nadolol, naphazoline, nifenalol, nizatidine, oxprenolol, pheniramine, phentolamine, pindolol, practolol, prazosin, promethazine, propranolol, pyrilamine (mepyramine), ranitidine, roxatidine, sotalol, tiamenidine, timolol, tramazoline, tripelennamine, triprolidine, tymazoline, UK-14,304

REFERENCE
Kaliszan,R.; Nasal,A.; Turowski,M. Binding site for basic drugs on α_1-acid glycoprotein as revealed by chemometric analysis of biochromatographic data, *Biomed.Chromatogr.*, **1995**, *9*, 211–215.

Podofilox



Molecular formula: $C_{22}H_{22}O_8$
Molecular weight: 414.41
CAS Registry No.: 518-28-5
Merck Index: 7704

SAMPLE
Matrix: blood
Sample preparation: Condition a 3 mL 500 mg Bond-Elut PH SPE cartridge with 6 mL MeOH and 3 mL 20 mM pH 5.5 ammonium acetate. Mix 500 µL serum with 500 µL 20 mM pH 5.5 ammonium acetate and 50 µL 760 mM sodium dodecyl sulfate. Add to the SPE cartridge, wash with 3 mL 20 mM ammonium acetate and 3 mL MeOH:water 10:90. Elute with 2 mL MeOH, evaporate to dryness at 43° under reduced pressure, reconstitute in 150 µL MeOH:water 36:64.

HPLC VARIABLES
Column: 300 × 3.9 Bondclone 10 C18 (Phenomenex, Torrance, CA, USA)
Mobile phase: MeOH:40 mM pH 6.9 KH_2PO_4:0.14 mM 1-heptanesulfonic acid 40:60:0.6
Flow rate: 2
Detector: F ex 230 em 330

CHROMATOGRAM
Retention time: 28
Internal standard: podofilox
Limit of detection: 200 ng/mL
Limit of quantitation: 500 ng/mL

OTHER SUBSTANCES
Extracted: etoposide

KEY WORDS
serum; SPE; pharmacokinetics; podofilox is IS

REFERENCE
Manouilov,K.K.; McGuire,T.R.; Gordon,B.G.; Gwilt,P.R. Assay for etoposide in human serum using solid-phase extraction and high-performance liquid chromatography with fluorescence detection, *J.Chromatogr.B*, **1998**, *707*, 342–346.

SAMPLE
Matrix: plants
Sample preparation: Grind 10 g freeze-dried rhizomes to 20 mesh, add 100 mL water, stir, boil for 20 min, cool to 40°, centrifuge at 8000 g for 30 min, freeze-dry the residue. Shake 50 mg residue with 5 mL mobile phase for 5 min, centrifuge at 1500 g for 10 min, inject an aliquot of the supernatant.

HPLC VARIABLES
Guard column: 32 × 5 Co:Pell ODS C18 pellicular
Column: 250 × 4.6 Partisil 10 ODS 3 C18
Mobile phase: MeCN:water 40:60
Flow rate: from 2 to 7 over 5 min (Waters program 8)

Detector: UV 254

CHROMATOGRAM
Retention time: k' 5.0

OTHER SUBSTANCES
Extracted: peltatin, picropodophyllotoxin, desoxypodophyllotoxin

REFERENCE
Bedows,E.; Hatfield,G.M. An investigation of the antiviral activity of *Podophyllum peltatum*, *J.Nat.Prod.*, **1982**, *45*, 725–729.

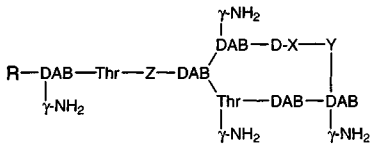
SAMPLE
Matrix: plants
Sample preparation: Extract from root and rhizome with 95% EtOH.

HPLC VARIABLES
Mobile phase: MeOH:water 50:50
Detector: UV 285

REFERENCE
Bai,Y.; Xu,J. [Determination of podophyllotoxin content in the root and rhizome of Podophyllum emodi by HPLC] (Chem.Abs. 1988, 109, 116127v), *Zhongyao Tongbao*, **1988**, *13*, 217–219.

Polymyxin

Molecular formula: $C_{56}H_{98}N_{16}O_{13}$ (B_1)
Molecular weight: 1203.49 (B_1)
CAS Registry No.: 1406-11-7, 1404-26-8 (B), 1405-20-5 (B sulfate)
Merck Index: 7734



DAB = L-α,γ-diaminobutyric acid

Polymyxin B_1	R = (+)-6-methyloctanoyl	X = Phe	Y = Leu	Z = DAB
B_2	R = 6-methylheptanoyl	X = Phe	Y = Leu	Z = DAB
D_1	R = (+)-6-methyloctanoyl	X = Leu	Y = Thr	Z = D-Ser
D_2	R = 6-methylheptanoyl	X = Leu	Y = Thr	Z = D-Ser

SAMPLE
Matrix: formulations
Sample preparation: Sandwich cream or ointment between two layers of 200 mesh silica gel, extract with carbon dioxide:MeOH 95:5 at 300 atmospheres at 55° at 2 mL/min for 75 min (restrictor 300°), sonicate the SPE tube, frits, and silica gel with MeOH:100 mM HCl 25:75 containing 0.1% Tween 80 for 15 min, filter (0.2 μm) inject an aliquot of the filtrate. (SFE removes the hydrocarbon base of the cream or ointment leaving behind the insoluble polymyxin.)

HPLC VARIABLES
Column: 250 × 4.6 5 μm Synchropak SCD
Mobile phase: MeCN:buffer 21.5:78.5 (Buffer was 100 mM KH_2PO_4 containing 0.1% trifluoroacetic acid.)
Flow rate: 1.5
Injection volume: 50
Detector: UV 215

CHROMATOGRAM
Limit of quantitation: 0.016%

KEY WORDS
SFE; cream; ointment; SPE

REFERENCE
Moore,W.N.; Taylor,L.T. Analytical inverse supercritical fluid extraction of polar pharmaceutical compounds from cream and ointment matrices, *J.Pharm.Biomed.Anal.*, **1994**, *12*, 1227–1232.

SAMPLE
Matrix: solutions
Sample preparation: Inject 10 μL of a 1 mg/mL solution.

HPLC VARIABLES
Column: 250 × 4.6 5 μm Vydac TP C18
Mobile phase: Gradient. A was 0.1% trifluoroacetic acid in water. B was 0.075% trifluoroacetic acid in MeCN. A:B from 90:10 to 20:80 over 20 min.
Flow rate: 1.2
Injection volume: 10
Detector: UV 215

CHROMATOGRAM
Retention time: 12.0

OTHER SUBSTANCES
Simultaneous: degradation products.

REFERENCE
Vaara,M. Analytical and preparative high-performance liquid chromatography of the papain-cleaved derivative of polymyxin B, *J.Chromatogr.*, **1988**, *441*, 423–430.

SAMPLE
Matrix: solutions

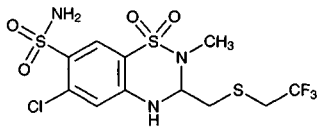
HPLC VARIABLES
Guard column: 45 × 4.7 Ultrasphere C18
Column: 250 × 4.7 Ultrasphere C18
Mobile phase: Gradient. A was 0.15% trifluoroacetic acid in water. B was 0.15% trifluoroacetic acid in MeCN. A:B from 100:0 to 50:50 over 25 min.
Flow rate: 2
Detector: UV 215

CHROMATOGRAM
Retention time: 18.5

OTHER SUBSTANCES
Simultaneous: degradation products

REFERENCE
Danner,R.L.; Joiner,K.A.; Rubin,M.; Patterson,W.H.; Johnson,N.; Ayers,K.M.; Parrillo,J.E. Purification, toxicity, and antiendotoxin activity of polymyxin B nonapeptide, *Antimicrob.Agents Chemother.*, **1989**, *33*, 1428–1434.

Polythiazide



Molecular formula: $C_{11}H_{13}ClF_3N_3O_4S_3$
Molecular weight: 439.89
CAS Registry No.: 346-18-9
Merck Index: 7744
Lednicer No.: 1 360

SAMPLE

Matrix: blood
Sample preparation: 1 mL Serum + 500 μL 1 M citric acid, mix, inject onto column A with mobile phase A and elute to waste, elute column A to waste with mobile phase B, elute polythiazide from column A with mobile phase C into a mixing chamber where it is mixed with 50 mM trifluoroacetic acid pumped at 2.4 mL/min before flowing onto column B, elute column B with mobile phase D, monitor the effluent from column B. (Backflush column A with MeCN: 50 mM trifluoroacetic acid 80:20 then forward flush with 20 mM tris acetate.)

HPLC VARIABLES

Column: A 60 × 4 PRP-1 (Hamilton); B 30 × 4 silica ODS (Shandon) + 250 × 4 5 μm Hypersil ODS
Mobile phase: A 790 mL 20 mM Citric acid + 210 mL 20 mM LiOH, pH 3; B MeOH:buffer 42: 58 (Buffer was 20 mM pH 7 tris acetate lithium hydroxide.); C MeOH:buffer 58:42 (Buffer was pH 11 citric acid lithium hydroxide.); D Gradient. MeCN:50 mM trifluoroacetic acid from 20: 80 to 58:42
Flow rate: A 1; B 2.5; C 1.3; D ?
Injection volume: 1500
Detector: UV 269

CHROMATOGRAM

Retention time: 13
Limit of detection: 0.5 ng/mL

KEY WORDS

serum; column-switching

REFERENCE

Schöneshöfer,M.; Heilmann,P.; Rejaibi,R. Automated column liquid chromatographic determination of polythiazide in human serum, *J.Chromatogr.*, **1987**, *417*, 434–438.

SAMPLE

Matrix: blood, urine
Sample preparation: Plasma. 3 mL Plasma + 1.5 mL 10 mM NaOH + 800 μL 100 mM HCl + 10 mL dichloromethane, shake on a platform shaker for 20 min, centrifuge at -10° at 3000 rpm for 15 min, repeat extraction twice more. Combine all organic layers and evaporate them to dryness under a stream of nitrogen at 50°, reconstitute the residue in 50 μL, vortex, inject whole amount. Urine. 5 mL Urine + 2 mL 10 mM NaOH + 2 mL 0.68% KH_2PO_4 adjusted to pH 6.1 + 10 mL dichloromethane, shake on a platform shaker for 20 min, centrifuge at -10° at 3000 rpm for 15 min. Remove the organic layer and evaporate it to dryness under a stream of nitrogen at 50°, reconstitute the residue in 100 μL, vortex, inject a 20 μL aliquot.

HPLC VARIABLES

Column: μBondapak C18
Mobile phase: MeCN:glacial acetic acid:water 35:2:63 (plasma) or MeCN:water 40:60 (urine)
Flow rate: 2
Injection volume: 20-50
Detector: UV 280

CHROMATOGRAM

Retention time: 9 (plasma), 8 (urine)

Internal standard: polythiazide

OTHER SUBSTANCES
Extracted: benzthiazide

KEY WORDS
polythiazide is IS; plasma

REFERENCE
Meyer,M.C.; Hwang,P.; Straughn,A.B.; Rotenberg,K. HPLC determination of benzthiazide in biologic material, *Biopharm.Drug Dispos.*, **1982**, *3*, 1–9.

SAMPLE
Matrix: urine
Sample preparation: 2 mL Urine + 0.5 g solid buffer I (pH 5-5.5), vortex 15 s, add 4 mL ethyl acetate, agitate for 10 min, centrifuge at 600 g for 5 min. Remove organic layer and vortex it with 2 mL 5% aqueous lead acetate for 10 s, centrifuge at 600 g for 5 min, remove and keep organic phase. 2 mL Urine + 0.5 g solid buffer II (pH 9-9.5), vortex 15 s, add 4 mL ethyl acetate, agitate for 10 min, centrifuge at 600 g for 5 min. Remove organic layer and combine it with previous organic layer. Evaporate to dryness at 50° under a stream of nitrogen, reconstitute in 300 μL 50 μg/mL β-hydroxyethyltheophylline in MeOH, inject 5 μL aliquot. (Solid buffer I was KH_2PO_4:Na_2HPO_4 99:1, solid buffer II was $NaHCO_3$:K_2CO_3 3:2.)

HPLC VARIABLES
Column: 250 × 4.6 5 μm HP Hypersil ODS (A) or HP LiChrosorb RP-18 (B)
Mobile phase: Gradient. MeCN:buffer from 15:85 at 2 min to 80:20 at 20 min (Buffer was 50 mM NaH_2PO_4 containing 16 mM propylamine hydrochloride, adjusted to pH 3 with concentrated phosphoric acid.)
Flow rate: 1
Injection volume: 5
Detector: UV 230, UV 275

CHROMATOGRAM
Retention time: 14.5 (A), 15.2 (B)
Internal standard: β-hydroxyethyltheophylline (3.7 (A), 4.4 (B))
Limit of detection: 500 ng/mL

OTHER SUBSTANCES
Extracted: furosemide, metolazone, amiloride, acetazolamide, chlorothiazide, hydrochlorothiazide, quinethazone, triamterene, hydroflumethiazide, chlorthalidone, dichlorphenamide, trichloromethiazide, methyclothiazide, benzthiazide, cyclothiazide, ethacrynic acid, bumetanide, probenecid, spironolactone, canrenone, flumethiazide
Noninterfering: acetaminophen, aspirin, caffeine, diflunisal, fenoprofen, ibuprofen, indomethacin, methocarbamol, naproxen, phenylbutazone, sulindac, tetracycline, theobromine, theophylline, tolmetin, trimethoprim, verapamil
Interfering: bendroflumethiazide

REFERENCE
Cooper,S.F.; Massé,R.; Dugal,R. Comprehensive screening procedure for diuretics in urine by high-performance liquid chromatography, *J.Chromatogr.*, **1989**, *489*, 65–88.

SAMPLE
Matrix: urine
Sample preparation: 5 mL Urine + 50 μL 100 μg/mL 7-propyltheophylline in MeOH + 200 μL ammonium chloride buffer + 2 g NaCl, extract with 6 mL ethyl acetate by rocking at 40 movements/min for 20 min and centrifuging at 800 g for 5 min, repeat extraction, combine organic layers, evaporate to dryness at 40° under a stream of nitrogen. Reconstitute in 200 μL MeCN: water 15:85 and inject 20 μL aliquots. (Ammonium chloride buffer was 28 g ammonium chloride in 100 mL water with the pH adjusted to 9.5 with concentrated ammonia solution.)

HPLC VARIABLES
Column: 75 × 4.6 3 μm Ultrasphere ODS

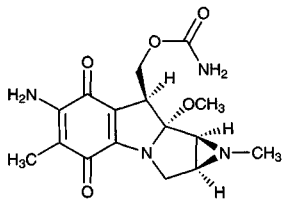
Mobile phase: Gradient. MeCN:100 mM ammonium acetate adjusted to pH 3 with concentrated phosphoric acid. From 10:90 to 15:85 over 2 min to 55:45 over 3 min to 60:40 over 3 min. Kept at 60:40 for 1 min, decreased to 10:90 over 1 min and equilibrated at 10:90 for 2 min.
Flow rate: 1
Injection volume: 20
Detector: UV 270

CHROMATOGRAM
Retention time: 6.9
Internal standard: 7-propyltheophylline (4.5)

OTHER SUBSTANCES
Simultaneous: xipamide, bumetanide, acetazolamide, amiloride, buthiazide, benzthiazide, canrenone, caffeine, clopamide, chlorthalidone, cyclothiazide, diclofenamide, furosemide, hydrochlorothiazide, mesocarb, morazone, piretanide, probenecid, spironolactone, torsemide, triamterene
Interfering: bendroflumethiazide, ethacrynic acid

REFERENCE
Ventura,R.; Nadal,T.; Alcalde,P.; Pascual,J.A.; Segura,J. Fast screening method for diuretics, probenecid and other compounds of doping interest, *J.Chromatogr.A*, **1993**, *655*, 233–242.

Porfiromycin



Molecular formula: $C_{16}H_{20}N_4O_5$
Molecular weight: 348.36
CAS Registry No.: 801-52-5
Merck Index: 7756

SAMPLE
Matrix: blood
Sample preparation: Centrifuge plasma at 15800 g at 4° for 5 min. 500 µL Plasma + 1 mL MeCN, stir for 1 min, centrifuge at 15800 g for at 4° for 10 min. Lyophilize the supernatant in a vacuum centrifuge (Hetovac VR-1, Allerod, Denmark). Reconstitute the residue in 150 µL MeOH:10 mM pH 6.5 NaH_2PO_4 30:70. Inject a 50 µL aliquot.

HPLC VARIABLES
Column: 250 × 4 5 µm Hypersil ODS
Mobile phase: MeOH:10 mM pH 6.5 NaH_2PO_4 30:70
Column temperature: 30
Flow rate: 1.3
Injection volume: 50
Detector: UV 365

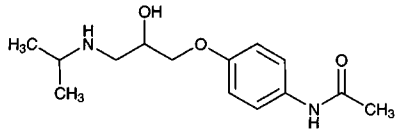
CHROMATOGRAM
Retention time: 6.64
Internal standard: porfiromycin

OTHER SUBSTANCES
Extracted: mitomycin
Noninterfering: dexamethasone, lorazepam, mezlocillin, ondansetron, meperidine

KEY WORDS
plasma; porfiromycin is IS

REFERENCE
Joseph,G.; Biederbick,W.; Woschée,U.; Theisohn,M.; Klaus,W. Sensitive and convenient high-performance liquid chromatographic method for the determination of mitomycin C in human plasma, *J.Chromatogr.B*, **1997**, *698*, 261–267.

Practolol



Molecular formula: $C_{14}H_{22}N_2O_3$
Molecular weight: 266.34
CAS Registry No.: 6673-35-4
Merck Index: 7882
Lednicer No.: 2 106

SAMPLE

Matrix: solutions
Sample preparation: Prepare a 10 μg/mL solution in MeOH, inject a 20 μL aliquot.

HPLC VARIABLES

Column: 125 × 4.9 Spherisorb S5W silica
Mobile phase: MeOH containing 10 mM ammonium perchlorate and 1 mL/L 100 mM NaOH in MeOH, pH 6.7
Flow rate: 2
Injection volume: 20
Detector: E, LeCarbone, V25 glassy carbon electrode, + 1.2 V

CHROMATOGRAM

Retention time: 1.4

OTHER SUBSTANCES

Also analyzed: acebutolol, acepromazine, acetophenazine, N-acetylprocainamide, albuterol, alprenolol, amethocaine, amiodarone, amitriptyline, antazoline, atenolol, azacyclonal, bamethan, benactyzine, benperidol, benzethidine, benzocaine, benzoctamine, benzphetamine, benzquinamide, bromhexine, bromodiphenhydramine, bromperidol, brompheniramine, brompromazine, buclizine, bufotenine, bupivacaine, buprenorphine, butacaine, butethamate, chlorcyclizine, chlorpheniramine, chlorphenoxamine, chlorprenaline, chlorpromazine, chlorprothixene, cimetidine, cinchonidine, cinnarizine, clemastine, clomipramine, clonidine, cocaine, cyclazocine, cyclizine, cyclopentamine, cyproheptadine, deserpidine, desipramine, dextromoramide, dextropropoxyphene, dicyclomine, diethylcarbamazine, diethylpropion, diethylthiambutene, dihydroergotamine, dimethindene, dimethothiazine, diphenhydramine, diphenoxylate, dipipanone, diprenorphine, dipyridamole, disopyramide, dothiepin, doxapram, doxepin, doxylamine, droperidol, ephedrine, ergocornine, ergocristine, ergocristinine, ergocryptine, ergometrine, ergosine, ergosinine, ergotamine, ethopropazine, etorphine, etoxeridine, fenethazine, fenfluramine, fenoterol, fentanyl, flavoxate, fluopromazine, flupenthixol, fluphenazine, flurazepam, haloperidol, hydroxyzine, hyoscine, ibogaine, imipramine, indapamine, iprindole, isothipendyl, isoxsuprine, ketanserin, laudanosine, lidocaine, lofepramine, loxapine, maprotiline, mecamylamine, meclophenoxate, meclozine, medazepam, mephentermine, mepivacaine, meptazinol, mepyramine, mesoridazine, metaraminol, methadone, methamphetamine, methapyrilene, methdilazene, methotrimeprazine, methoxamine, methoxyphenamine, methoxypromazine, methylephedrine, methylergonovine, methysergide, metoclopramide, metopimazine, metoprolol, mianserin, morazone, nadolol, nalorphine, naloxone, naphazoline, nicotine, nifedipine, nomifensine, nortriptyline, noscapine, orphenadrine, oxeladin, oxprenolol, oxymetazolin, papaverine, pargyline, pecazine, penbutolol, pentazocine, penthienate, pericyazine, perphenazine, phenadoxone, phenampromide, phenazocine, phenbutrazate, phendimetrazine, phenelzine, phenglutarimide, phenindamine, pheniramine, phenmetrazine, phenomorphan, phenoperidine, phenothiazine, phenoxybenzamine, phentolamine, phenylephrine, phenyltoloxamine, physostigmine, piminodine, pimozide, pindolol, pipamazine, pipazethate, piperacetazine, piperidolate, pipradol, pirenzepine, piritramide, pizotifen, pramoxine, prazosin, prenylamine, prilocaine, primaquine, proadifen, procainamide, procaine, prochlorperazine, procyclidine, proheptazine, prolintane, promazine, promethazine, pronethalol, properidine, propiomazine, propranolol, prothipendyl, protriptyline, proxymetacaine, pseudoephedrine, pyrimethamine, quinidine, quinine, ranitidine, rescinnamine, sotalol, tacrine, terazosin, terbutaline, terfenadine, thenyldiamine, theophylline, thiethylperazine, thiopropazate, thioproperazine, thioridazine, thiothixene, thonzylamine, timolol, tocainide, tolpropamine, tolycaine, tranylcypromine, trazodone, trifluoperazine, trifluperidol, trimeperidine, trimeprazine, trimethobenzamide, trimethoprim, trimipramine, tripelennamine, triprolidine, tryptamine, verapamil, xylometazoline

REFERENCE
Jane,I.; McKinnon,A.; Flanagan,R.J. High-performance liquid chromatographic analysis of basic drugs on silica columns using non-aqueous ionic eluents. II. Application of UV, fluorescence and electrochemical oxidation detection, *J.Chromatogr.*, **1985**, *323*, 191–225.

SAMPLE
Matrix: solutions

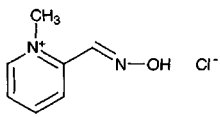
HPLC VARIABLES
Column: 150 × 4.6 12 μm 1-myristoyl-2-[(13-carboxyl)-tridecoyl]-sn-3-glycerophosphocholine chemically bonded to silica (Regis)
Mobile phase: MeCN:100 mM pH 7.0 phosphate buffer 20:80
Flow rate: 1
Detector: UV 254

CHROMATOGRAM
Retention time: k' 0.86

OTHER SUBSTANCES
Also analyzed: acebutolol, alprenolol, antazoline, atenolol, betaxolol, bisoprolol, bopindolol, bupranolol, carteolol, celiprolol, chloropyramine, chlorpheniramine, cicloprolol, cimetidine, cinnarizine, cirazoline, clonidine, dilevalol, dimethindene, diphenhydramine, doxazosin, esmolol, famotidine, isothipendyl, ketotifen, metiamide, metoprolol, moxonidine, nadolol, naphazoline, nifenalol, nizatidine, oxprenolol, pheniramine, phentolamine, pindolol, pizotyline (pizotifen), prazosin, promethazine, propranolol, pyrilamine (mepyramine), ranitidine, roxatidine, sotalol, tiamenidine, timolol, tramazoline, tripelennamine, triprolidine, tymazoline, UK-14,304

REFERENCE
Kaliszan,R.; Nasal,A.; Turowski,M. Binding site for basic drugs on α_1-acid glycoprotein as revealed by chemometric analysis of biochromatographic data, *Biomed.Chromatogr.*, **1995**, *9*, 211–215.

Pralidoxime chloride



Molecular formula: $C_7H_9ClN_2O$
Molecular weight: 172.61
CAS Registry No.: 51-15-0, 94-63-3 (iodide), 154-97-2 (mesylate)
Merck Index: 7884

SAMPLE
Matrix: blood, urine
Sample preparation: Add 1 mL whole blood or urine to Toxi-Tube A (Toxi-Lab, Irvine CA), add 3 mL water, mix by gentle inversion for 5 min, centrifuge at 1500 g for 5 min. Remove the organic layer and evaporate it to dryness under a stream of nitrogen at 40°, reconstitute the residue with 50 μL MeCN:water 50:50, vortex for 10 s, centrifuge at 7500 g for 2 min, inject a 10 (urine) or 30 (blood) μL aliquot. (The detector wavelength shown is the wavelength of maximum absorbance. This will not necessarily be the optimal wavelength for the separation. Multiple wavelengths from 200-350 nm can be scanned using a diode-array detector. Otherwise, 220 nm may be a reasonable choice for initial work. Matrix may interfere.)

HPLC VARIABLES
Guard column: 20 mm long Symmetry C18
Column: 250 × 4.6 5 μm Symmetry C8 (Waters)
Mobile phase: Gradient. A was 50 mM pH 3.8 sodium phosphate buffer. B was MeCN. A:B 85:15 for 6.5 min, 65:35 for 18.5 min, 20:80 for 3 min (step gradient), re-equilibrate at initial conditions for 7 min.
Column temperature: 30
Flow rate: 1 for 6.5 min, to 1.5 over 18.5 min, maintain at 1.5 for 3 min (re-equilibrate at 1.5 mL/min)

Injection volume: 10-30
Detector: UV 295

CHROMATOGRAM
Retention time: 2.863

KEY WORDS
whole blood

REFERENCE
Gaillard,Y.; Pépin,G. Use of high-performance liquid chromatography with photodiode-array UV detection for the creation of a 600-compound library. Application to forensic toxicology, *J.Chromatogr.A*, **1997**, *763*, 149–163.

SAMPLE
Matrix: formulations
Sample preparation: Dilute 1 mL formulation to 25 mL with mobile phase, inject a 5 μL aliquot.

HPLC VARIABLES
Column: 150 × 4.6 3 μm Hypersil ODS
Mobile phase: MeCN:buffer A:buffer B:water 10:1:9:80 containing 2.66 g/L sodium lauryl sulfate (Buffer A was 98 g orthophosphoric acid in 800 mL water, adjust to pH 3.0 with 25% trimethylamine solution, make up to 1 L with water. Buffer B was obtained by mixing 1 M NaH_2PO_4 and 1 M orthophosphoric acid to obtain a pH of 3.0.)
Column temperature: 30
Flow rate: 1.5
Injection volume: 3
Detector: UV 262

CHROMATOGRAM
Retention time: 12.5

OTHER SUBSTANCES
Simultaneous: degradation products

KEY WORDS
injections; buffer

REFERENCE
Utley,D. Analysis of formulations containing pralidoxime mesylate by liquid chromatography, *J.Chromatogr.*, **1987**, *396*, 237–250.

SAMPLE
Matrix: formulations
Sample preparation: Dilute 25 μL formulation to 100 mL with mobile phase, inject a 45-60 μL aliquot.

HPLC VARIABLES
Column: 300 × 3.9 10 μm μPorasil
Mobile phase: MeCN:buffer 86:14 (Buffer was 52.5 mM acetic acid containing 8.36 mM tetraethylammonium chloride, pH 2.9.)
Flow rate: 1
Injection volume: 45-60
Detector: UV 295

CHROMATOGRAM
Retention time: 8.5

OTHER SUBSTANCES
Simultaneous: degradation products (UV 266.5)

KEY WORDS
stability-indicating; injections

REFERENCE
Schroeder,A.C.; DiGiovanni,J.H.; Von Bredow,J.; Heiffer,M.H. Pralidoxime chloride stability-indicating assay and analysis of solution samples stored at room temperature for ten years, *J.Pharm.Sci.*, **1989**, *78*, 132–136.

SAMPLE
Matrix: formulations
Sample preparation: Dilute with water, inject a 20 μL aliquot.

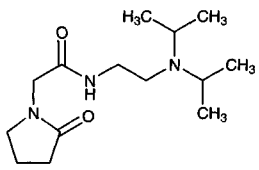
HPLC VARIABLES
Guard column: 12.5 × 4 5 μm Zorbax RX-C18
Column: 250 × 4.6 5 μm Zorbax RX-C18
Mobile phase: MeCN:buffer 3:97 (Buffer was 50 mM NaH_2PO_4 + 1 mM tetramethylammonium chloride + 1 mM 1-octanesulfonic acid adjusted to pH 3.5 with concentrated orthophosphoric acid.)
Column temperature: 25
Flow rate: 1
Injection volume: 20
Detector: UV 203

OTHER SUBSTANCES
Also analyzed: atropine, phenol, tropic acid, obidoxime, HI-6

KEY WORDS
nerve agent antidote mixtures

REFERENCE
Paddle,B.M.; Dowling,M.H. Simple high-performance liquid chromatographic method for assessing the deterioration of atropine-oxime mixtures employed as antidotes in the treatment of nerve agent poisoning, *J.Chromatogr.*, **1993**, *648*, 373–380.

Pramiracetam



Molecular formula: $C_{14}H_{27}N_3O_2$
Molecular weight: 269.39
CAS Registry No.: 68497-62-1, 75733-50-5 (HCl), 72869-16-0 (sulfate)
Merck Index: 7886

SAMPLE
Matrix: blood
Sample preparation: 1 mL Plasma + 3 μg IS + 100 μL 100 mM NaOH + 5 mL chloroform, mix, centrifuge at 2000 g for 3 min. Remove the organic layer and evaporate it to dryness at 70°, reconstitute the residue in 500 μL 1 M (sic) HCl and 2 mL dichloromethane:isopropanol 90:10, centrifuge. Remove the aqueous phase and add it to 700 μL 100 mM NaOH and 5 mL chloroform, mix, centrifuge. Remove the organic layer and evaporate it to dryness at 70°, reconstitute the residue in 50 μL mobile phase, inject a 20 μL aliquot.

HPLC VARIABLES
Column: 100 mm long 3 μm Spherisorb ODS
Mobile phase: MeCN:70 mM pH 5.5 KH_2PO_4 30:70
Injection volume: 20
Detector: UV 215

CHROMATOGRAM
Internal standard: LMC
Limit of detection: 100 ng/mL

KEY WORDS
plasma; pharmacokinetics

REFERENCE
Auteri,A.; Blardi,P.; Celasco,G.; Segre,G.; Urso,R. Pharmacokinetics of pramiracetam in healthy volunteers after oral administration, *Int.J.Clin.Pharmacol.Res.*, **1992**, *12*, 129–132.

Pramlintide

Molecular formula: $C_{171}H_{267}N_{51}O_{53}S_2$
Molecular weight: 3949.47
CAS Registry No.: 151126-32-8

SAMPLE
Matrix: formulations
Sample preparation: Condition a 6 mL 200 mg C4 SPE cartridge (Baker) with MeCN and water. Add the liquid formulation to the SPE cartridge, wash with water, elute with MeCN:water 40:60 containing 0.1% trifluoroacetic acid. Evaporate the eluate to dryness and dissolve the residue in 30 mM pH 4.0 sodium acetate so as to obtain a 2 mg/mL solution. Inject an aliquot.

HPLC VARIABLES
Column: 100 × 4.6 5 μm PolySULFOETHYL Aspartamide column (Poly LC, Columbia MD)
Mobile phase: Gradient. A was MeCN:5 mM potassium dihydrogen phosphate containing 5 mM sodium perchlorate 40:60, pH 5.8. B was MeCN:5 mM potassium dihydrogen phosphate containing sodium perchlorate 40:60, pH 5.8. A:B from 98:2 to 76:24 over 24 min, maintain at 76:24 for 37 min, to 12:88 over 20 min.
Column temperature: 40
Flow rate: 0.8
Detector: UV 220

CHROMATOGRAM
Retention time: 46

OTHER SUBSTANCES
Extracted: degradation products

KEY WORDS
liquid formulations; SPE

REFERENCE
Hekman,C.M.; DeMond,W.; Dixit,T.; Mauch,S.; Nuechterlein,M.; Stepanenko,A.; Williams,J.D.; Ye,M. Isolation and identification of peptide degradation products of heat stressed pramlintide injection drug product, *Pharm.Res.*, **1998**, *15*, 650–659.

SAMPLE
Matrix: formulations
Sample preparation: Condition a 6 mL 200 mg C4 SPE cartridge (Baker) with MeCN and water. Add the liquid formulation to the SPE cartridge, wash with water, elute with MeCN:water 40:60 containing 0.1% trifluoroacetic acid. Evaporate the eluate to dryness and dissolve the residue in 30 mM pH 4.0 sodium acetate so as to obtain a 2 mg/mL solution. Inject an aliquot.

HPLC VARIABLES
Column: 250 × 4.6 5 μm Symmetry C8
Mobile phase: Gradient. A was MeCN:200 mM potassium dihydrogen phosphate 6.05:93.95, pH 3.0. B was MeCN:200 mM potassium dihydrogen phosphate 22.45:77.55, pH 3.0. C was MeCN:200 mM potassium dihydrogen phosphate 26.9:73.1, pH 3.0. A:B:C from 100:0:0 to 0:100:0 over 16 min, maintain at 0:100:0 for 69 min, to 0:0:100 over 15 min, maintain at 0:0:100 for 10 min
Column temperature: 55
Flow rate: 0.5
Detector: UV 220

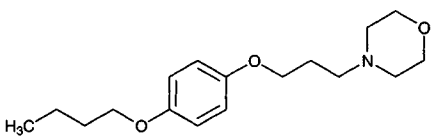
CHROMATOGRAM
Retention time: 57

OTHER SUBSTANCES
Extracted: degradation products

KEY WORDS
liquid formulation; SPE

REFERENCE
Hekman,C.M.; DeMond,W.; Dixit,T.; Mauch,S.; Nuechterlein,M.; Stepanenko,A.; Williams,J.D.; Ye,M. Isolation and identification of peptide degradation products of heat stressed pramlintide injection drug product, *Pharm.Res.*, **1998**, *15*, 650–659.

Pramoxine



Molecular formula: $C_{17}H_{27}NO_3$
Molecular weight: 293.41
CAS Registry No.: 140-65-8, 637-58-1 (HCl)
Merck Index: 7888
Lednicer No.: 1 18

SAMPLE
Matrix: formulations
Sample preparation: Collect contents of an aerosol can using 100 mL ether:MeOH 5:1, extract with 100 mL 20% acetic acid, extract with 75 mL 20% acetic acid, combine the extracts, make up to 250 mL with water, inject a 15 μL aliquot.

HPLC VARIABLES
Column: 250 × 4 10 μm μBondapak C18
Mobile phase: MeOH:water:acetic acid:methanesulfonic acid 50:48.9:1:0.1
Flow rate: 2
Injection volume: 15
Detector: UV 286

CHROMATOGRAM
Retention time: 5

OTHER SUBSTANCES
Simultaneous: methyl paraben